5-2012

Essays in Public Economics

Kathleen Player
Clemson University, katiesobczyk@gmail.com

ESSAYS IN PUBLIC ECONOMICS

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Economics

---

by
Kathleen Grace Sobczyk Player
May 2012

Accepted by:
Dr. William Dougan, Committee Chair
Dr. Raymond Sauer
Dr. Robert Tollison
Dr. Kevin Tsui

ABSTRACT

The first two chapters of this dissertation are closely related and pertain to small business reactions to income tax changes. The final chapter investigates the value consumers place on residential community associations.

Small businesses file taxes in accordance with the personal income tax code because they are considered flow-through entities. Thus, personal income tax reforms directly affect the incentives small business owners face regarding employment and operations. I use the changes in personal income-tax rates during the 1993 and 2001-2003 reforms and micro-level data to estimate the effect of statutory tax-rate changes on small-business employment decisions. I add two contributions to the current literature: first, I allow for intertemporal tax planning and secondly, I allow the firm's decision to employ labor to be correlated with the firm's salary expense decision. Estimation of a Heckman selection model for salary expenses shows that the probability that a business will employ labor is 1.18% higher when current tax rates increase by one percentage point and 0.70% lower when future rates are expected to increase by one percentage point. Among firms that already employ labor, the median salary expense elasticity with respect to current tax rates is -0.64. These estimates are larger than those reported in previous research because my model includes future taxes and allows for correlation between the firm’s employment and salary decisions. Omitting the intertemporal tax responses biases the estimates of previous researchers upwards, whereas assuming the two firm decisions are independent biases estimates towards zero.

After examining the employment responses of small businesses to income tax changes, I then estimate the marginal welfare cost associated with the behavioral changes. The marginal welfare cost of an increase in income tax rates affects small businesses in many ways. I examine one aspect of the cost of a tax increase on small business employers: the marginal welfare cost of reduced owner-effort exerted in the firm. The welfare cost of reduced owner-effort and the corresponding reduction in reported taxable business income can be estimated using the elasticity of taxable business income. The elasticity of taxable business income measures the long-run annual incremental cost of a permanent income tax increase, relative to the prior income tax regime. The permanent welfare cost of personal income tax increases on small business employers is $920 million for the 1993 tax reforms and $245 million for the 2001-2003 tax reforms. When small business employers supply less effort, they demand fewer productive inputs, including outside labor. Any outside labor displaced by the small business sector must transition to re-employment in the rest of the economy. The cost of displaced labor is in addition to the costs associated with the elasticity of taxable business income and is a one-time cost. I estimate the short-run cost of displaced labor to be $10 million for the 1993 reforms and $3.2 million for the 2001-2003 reforms. This cost is a one-time reduction in welfare from labor displacement when workers are not instantly absorbed by the rest of the economy.

Finally, in the third chapter, I examine sales price data on Spartanburg County homes both in and out of residential community associations to analyze the value of residential community associations. Comparable neighborhoods not in RCAs are

included to estimate the value consumers place on RCA affiliation. RCAs appear to increase property values by 2.2% in the sample. I then examine one neighborhood with 120 houses that has a mandatory homeowners' association for 30 lakefront properties. Homes in this particular RCA sell at a 3.8% premium to the other homes in the neighborhood. This is the capitalized net benefit of living on, and accessing the lake. I also examine the existing empirical literature on the efficiency of residential community associations and discuss the theoretical problems of analyzing RCA efficiency. My analysis shows that the existing empirical research on the efficiency of RCAs lacks identification and suffers from omitted variable bias. Including a variable for "property age" drastically changes the estimates and interpretations from the existing literature. Age is an important variable to include because it proxies for a host of factors like location, architectural-style, and projected maintenance costs, all of which influence property values. Omitting age downwardly biases the estimates.

DEDICATION

I would like to dedicate this manuscript to my loving husband who has patiently supported and encouraged me through the duration of graduate school, and to my family who have always been there with love and support.

ACKNOWLEDGMENTS

Special thanks to Daniel Feenberg and the National Bureau of Economic Research for providing the data used in Chapters 1 and 2, and the many emails and phone calls. Thank you to the H.B. Earhart Foundation which provided the financial support that enabled this research. Thank you to all the participants in the Public Economics Workshop at Clemson University and William Dougan, Raymond Sauer, Robert Tollison, and Kevin Tsui.

TABLE OF CONTENTS

Table of Contents (Continued)

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

THE IMPACT OF PERSONAL INCOME TAX RATES ON THE EMPLOYMENT DECISIONS OF SMALL BUSINESSES

Introduction

Small businesses are considered "flow-through" entities for income tax purposes. The business owner's wage income and business profits are taxed at the same marginal rate. Business owners can use their own labor solely or in conjunction with outside labor, a tax-deductible business expense, in the operations of the firm. Changes in tax rates affect the firm in two distinct ways: by altering the returns of the entire business entity and by inducing relative price changes in the production mix between outside labor and the owner's labor. When tax rates increase, the returns to the business decrease and production and labor demand decline through the scale effect. However, the price of outside labor falls relative to owner labor, so that if the owner's effort can be replaced by employed labor, the substitution effect may lead small firms to employ more outside labor.

Small businesses constitute a large portion of the U.S. economy. Roughly 7.5% of all workers, or 10.3 million people, were self-employed in 2003, and an additional 4.9 million people owned an incorporated business while reporting wages from another job (Hipple 2004). Small businesses account for a vast percentage of new job creation. Birch

(1987) estimates that firms with fewer than 20 employees accounted for 82% of new job creation between 1981 and 1985.[1]

The effect of personal marginal income-tax rates on the employment decisions of small businesses is a relatively unexplored topic, yet small businesses account for 94% of all businesses filing with the IRS.[2] I examine changes in the employment and wage bill decisions of small businesses in response to changes in current and future tax rates when selection on unobservables is assumed to occur among employers.

I seek to identify the two distinct effects of changes in current and future tax rates on the probability of employing labor and total wage bills due to the relative change in the price of owner effort. The probability of employing labor and total wage bills are not independent decision processes; therefore, a Heckman selection model is specified for pooled cross-sections from the NBER Public Use File on individual income-tax returns from 1992-2005 for sole proprietors filing a Schedule C.

The Heckman two-step model allows for the presence of a limited dependent variable (employers) and correlated processes for choosing to employ and then wage bill choice. The first step of the Heckman addresses the decision to employ outside labor. I estimate that a one percentage-point increase in current tax rates increases the probability of employing outside labor by 1.18 percent, while a one percentage-point increase in the

[1] Large estimates for gross job creation by small firms are also reported by Davis et al. (1996), as are high layoffs. Neumark et al. (2008) report small firms create more jobs than larger establishments but not to the extent of the Birch (1987) findings.

[2] C-corporations accounted for 6.6% of all IRS business filers in 2005, while sole proprietors accounted for 72%. The remaining 21% are mainly S-corporations and a few partnerships.

marginal tax rate next year decreases the probability of employing labor today by 0.70 percent.

The second step of the model comprises a regression that accounts for selection on unobservables by firms employing labor, and estimates the wage bill elasticity with respect to current and future tax rate changes. The mean and median wage bill elasticities with respect to current tax rates are -0.17 and -0.64, respectively. Increases in future tax rates make production today more attractive relative to production tomorrow, indicating that firms anticipating higher future taxes shift production intertemporally.

2 Income Tax Background

In 1992, Presidential Candidate Bill Clinton campaigned on a promise to raise taxes on the wealthiest Americans. In the aftermath of the election, the Omnibus Budget Reconciliation Act of 1993 (OBRA-93) was signed into law. OBRA-93 increased personal income-taxes on Americans reporting adjusted gross incomes in excess of $140,000.[3] Married taxpayers filing jointly with AGI greater than $250,000 faced marginal tax rates of 39.6% instead of 31%. Those with AGI greater than $140,000 but less than $250,000 faced a marginal tax rate of 36% instead of the previous 31%.

Most tax reforms, like the 1993 reforms, are announced months or years in advance.[4] With rational expectations or perfect foresight, future taxes are known with certainty and any deviations are random noise. Under the rational expectations theory,

[3] OBRA-93 also repealed the cap on Medicare taxes, increased the taxable portion of social security benefits, limited itemized deductions, increased Federal fuel taxes and expanded the Earned Income-tax Credit (EITC).

[4] The 1993 tax hikes were most likely anticipated in 1992 because the Clinton campaign focused on increasing taxes on the top 1% of taxpayers (defined as AGI greater than $139,999).

deviations from the equilibrium path would be random and only occur when tax-payers are "surprised" by relatively higher or lower tax rates than expected.

Whereas OBRA-93 increased tax rates, the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) lowered personal income-tax rates for most taxpayers. Tax-rate decreases were anticipated to phase in gradually through 2006. Rates initially decreased to 39.1% from 39.6% for the top tax-bracket and were scheduled to decline gradually to 35% over five years.[5] In May 2003, in an attempt to stave off recession, Congress passed the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). JGTRRA accelerated the tax decreases previously scheduled for 2006, making them effective immediately.[6]

Calculating the appropriate effective tax rate is not a straight forward process for business owners. The NBER's TAXIM model is useful for analysis on an individual's taxable income but does not adjust for any line-items found on the business schedules (Schedule C, Schedule E, Schedule F). Ideally, I would like the business owner's marginal tax rate without his wage bill and other business expenses which is not possible. The correct tax rate for decision-making depends on the particular issue under consideration: marginal tax rates, average tax rates or statutory tax rates could be the most relevant rate for behavioral changes. A part-time business owner working full-time for another firm may be most sensitive to marginal tax rates. Any additional income earned by the part-time business would be taxed at the marginal rate. Marginal rates are

[5] See Figures 1 and 2 for comparison of anticipated and actual tax rates.
[6] See Table 1 for all relevant marginal tax rate changes. With knowledge of future tax changes, taxpayer and employers can plan in advance to take advantage or avoid any tax changes.

also very difficult to estimate and can suffer from endogeneity[7]. The average tax rate may be more important to full-time owners: they receive wage and profit income from the business; when planning for taxes they examine their total tax liability and potential deductions.

The statutory tax rate may be appropriate when deciding how many businesses to operate or expanding existing operations[8]. The statutory tax rate is not likely to be endogenous because the majority of people do not bunch at tax bracket kink points.[9] Statutory rates offer transparency in most cases; it is relevant for either of the two prior scenarios because it determines the tax liability independent of behavioral adaptations.[10]

Using similar methodologies but studying different tax reforms, Carroll et al. (2000a) and LaLumia (2008) find conflicting coefficients for the contemporaneous employment and gross receipts responses of business owners to current tax-rate changes. My novel theoretical framework reconciles the conflicting estimates obtained by previous researchers. The theoretical models in the previous research predict negative labor-demand and wage bill coefficients for tax-rate increases. My model shows this is only the case for larger firms; small firms may actually employ more labor when tax rates increase.

---

[7] Marginal tax rate calculations are estimates that try to account for statutory and implicit tax rates as well as personal and itemized deductions and credits that arise from special features of the tax code.

[8] Statutory tax rates are the tax rates listed for each income-bracket in a given year by the Internal Revenue Service. For example, a taxpayer with the median taxable income of $90,443 in 2005 would be taxed at three different rates: the first $14,000 would be taxed at 10%, the next $42,800 would be taxed at 15% and anything in excess of $56,800 would be taxed at 25%.

[9] Bunching at kink points would indicate strong behavioral responses to bracket ranges; however, such behavior is not observed. See Saez (2009) for detailed analysis.

[10] Statutory rates may be the first indicator to businesses that marginal adjustments are necessary going forward.

Carroll et al. (2000a) and LaLumia (2008) implicitly assume the decisions to employ labor and the amount of labor are independent. LaLumia (2008) does not find evidence of increased employment probabilities or higher gross receipts, whereas Carroll et al. (2000a) do find such evidence.

LaLumia (2008) investigates changes in gross business receipts and in the probability of hiring labor before and after the Economic Growth and Tax Relief Reconciliation Act of 2001. She constructs a five-year panel beginning in 1999 and instruments for the tax decrease by applying post-reform tax rates to pre-reform reported income. While most tax reforms take place immediately, the 2001 tax reforms were intended to phase in through 2006 with small yearly decreases. When explaining the difference in her results and those by Carroll et al., LaLumia (2008) notes "the 2001 cuts were…more equally distributed across the income distribution (than the 1986 cuts)".[11]

Carroll et al. (2000a) use a two-year balanced panel of Schedule C filers appearing in both 1985 and 1988 to estimate the effects of the 1986 tax reforms on small business employment and wage bills. They model the contemporaneous behavior of individuals reacting to the tax rates of the current period and find that owners are 12% more likely to hire workers and increase salaries after a 10% decrease in the individual marginal income-tax rate.

LaLumia (2008) and Carroll et al. (2000a) estimate probit and least-squares models. The present study exploits the flexibility of the Heckman model to allow for selection on unobservables in the data to learn more about firms employing labor. The

[11] Taxes decreased to 38.5% from 50% for the top income-bracket in 1986. In 2001, the top rate was immediately reduced to 39.1% from 39.6%, with phased-in reductions to 35% through 2006.

two data-generating processes for choosing to employ labor and then choosing a wage bill may not be perfectly correlated, as is assumed in the alternative tobit specification. Carroll et al. (2000a) simply estimate least-squares regressions on observations with positive wage bills. My estimates will show the former least-squares estimates are biased with incorrect signs when the decision to employ labor and the wage bill level are not independent decisions.[13]

After replicating the Carroll et al. (2000a) findings, I then extend the literature to allow for anticipatory tax planning by firms and for correlation among the error terms in the two empirical decisions. I attempt to account for tax planning when tax rates are expected to change in the following period. My dataset consists of repeated cross-sections which allows for potential changes in the true population due to the legal reforms governing S-corporations[14]. A two-year panel focuses only on observations appearing in both years; Carroll et al. (2000a) report that their results do not statistically change when including employers present in only one of the years, so cross-sectional data may be a good approximation to the underlying data-generating process. The minute differences Carroll et al. (2000a) found indicate their panel results may include a small survivor bias and would be upwardly biased for tax rate decreases.

[13] Carroll et al. (2000a) employ a tobit model as a specification test, but they do not find meaningfully different results. OLS estimates on a truncated sample may provide reasonable crude estimates for marginal effects since the truncated mean is still fairly linear in **x** if the two decisions are independent; however, the estimates are inconsistent. If the decisions are not independent, OLS on a truncated sample is biased and inconsistent (Cameron and Trivedi, pg. 540-2).

[14] The 1986 reforms made S-corporations more attractive by increasing the allowed number of shareholders. The number of S-corporations as a percentage of all businesses filed with the IRS has gradually climbed to 12.5% in 2007 from 6.6% in 1988.

My analysis focuses on the tax reforms of 1993 and 2001-2003 to avoid complications arising from the changes to the definition of taxable income that occurred in 1986. The 1986 reform, studied by Carroll et al. (2000a), changed the definition of the taxable base as well as marginal tax rates, making it impossible to separate and identify the two independent effects.[15] This is a major criticism of all tax literature using only the 1986 reform for variation.[16] The 1993 and 2001-2003 reforms isolate the behavioral response of Schedule C filers with respect to marginal tax rate changes.[17] The results presented in Appendix A recreate the Carroll et al. (2000a) study using 1993 and 2001-2003 variation. The estimates provide a bias range for the impact of the definitional changes to the taxable-base in 1986.

Taxation affects the production mix of small businesses in many ways. Rather than simply reacting to current tax rates, business owners are presumably forward-looking. Many revenues and expenses can be shifted across consecutive tax years when upcoming tax changes are anticipated.[19] Owners can deduct higher levels of expenses by

[15] The 1986 Tax Reforms changed the definition of taxable income, or the tax base, in many ways, including: taxing capital gains as ordinary income, disallowing the deduction of consumer loan interest, eliminating income averaging, increasing the standard deduction, increasing the personal exemption amount, further restricting tax-deductable IRA contributions, increasing the depreciation lives of equipment purchases, limiting the deductions on passive investment losses, and requiring a social security number for all dependents claimed. It also made S-corporations more attractive by increasing the allowed number of shareholders.

[16] See Saez, Slemrod and Giertz (2009).

[17] Furthermore, the substantial rate cuts and changes in the definition of the taxable base in 1986 could induce changes in the Schedule C taxpayer distribution that would not be reflected in only two years of panel data.

[19] This analysis focuses on the net result of timing income since the data is ex-post and only speak to covariates that were actually shifted: Benefit of shifting income less the cost of shifting income.

shifting purchases of durable goods to years of relatively high marginal tax rates.[20] Higher marginal rates also increase the incentive to deduct personal expenses on the Schedule C.[21] When lower future tax rates are expected, business owners have the incentive to time and shift revenue to book in the low-tax year.

3 The Relative Price of Owner Effort

To allow for the full range of small business owners' potential responses to tax changes, a theoretical model must account for owner effort and the possibility of employing outside labor. The basic assumption is that firm owners maximize utility. Utility is increasing in consumption, generated from the firm's production and decreasing in owner effort (e):

$$U = U(C, e) \qquad (1)$$

All income earned from the business venture is taxed at the personal income-tax rate because the small business is a flow-through tax entity, meaning firm profits and income flow through to the owner and are taxed at personal tax rates rather than as a separate entity under corporate tax law.

Consumption is assumed to be the after-tax net income from the business:

$$C = (1-t)M\,, \qquad (2)$$

where firm net income is denoted by:

$$M = X - wL - rK \qquad (3)$$

[20] Higher rates can also promote "luxury office" spending that would not take place under relatively lower tax rates. Ceteris paribus, Persian rugs, leather and mahogany furniture, and Tiffany lamp purchases are more likely to reflect high tax periods than low.

[21] With proper documentation, meals, entertainment, travel and office supply expenses are appealing categories to increase.

where X is the production or output of the firm. Output is a function of three possible inputs: owner effort, hired labor, and capital. The total labor input is specified as the sum of the owner's direct labor and outside labor, so that hired labor is perfectly substitutable for the owner's labor. Owner effort (e) can take two forms: owner labor effort (e_L) where the owner performs tasks related to direct production (book keeping, sales, etc.) and owner managing effort (e_M) where the owner monitors the direct production of the outside labor he employs[22]. The firm's concave production function is therefore:

$$X = f(e_m, L + e_L, K) \qquad (4)$$

The owner chooses e_M, e_L, L, and K to maximize utility (*equation 1*) subject to equations (2), (3), and (4), and the nonnegativity constraints $e_L \geq 0$ and $L \geq 0$. The owner's optimization problem is therefore:

$$\underset{e_m,\, e_L,\, L}{\mathcal{L}} = U(C, e) + \lambda_0\{(1\text{-t})[f^*(e_m, L + e_L, K) - wL - rK] - C\} + \lambda_1(e_L) + \lambda_2(L) \qquad (5)$$

The Kuhn-Tucker conditions are:

$$U_c = \lambda_0 \qquad (6a)$$

$$-U_e = f_{e_m}\,(1\text{-}t)\,\lambda_0 \qquad (6b)$$

$$\lambda_0\,(1\text{-}t) f_{e_L} = -(U_e + \lambda_1) \qquad \text{if } L = 0,\ (\acute{L} = L + e_L) \qquad (6c)$$

$$f_{\acute{L}} = w \text{ if } e_L = 0 \qquad (6d)$$

$$f_k = r \qquad (6e)$$

[22] For simplicity, I assume the supply curve of total owner effort is upward sloping because the vast majority of business owners in my sample are married males with adjusted gross incomes below $250,000. This reasonable assumption is not necessarily true and leaves the possibility of a backwards bending effort supply curve to future work.

Condition 1 The complementary slackness condition requires $\lambda_1 \geq 0$ (or $\lambda_1 = 0$ if $e_L > 0$) and requires (e_L, e_m, L) to satisfy $e_L \geq 0$. If $\lambda_1 > 0$, it must be the case that $e_L = 0$.

Condition 2 The complementary slackness condition requires $\lambda_2 \geq 0$ (or $\lambda_2 = 0$ if $L > 0$) and requires (e_L, e_m, L) to satisfy $L \geq 0$. If $\lambda_2 > 0$, it must be the case that $L = 0$.

The Kuhn-Tucker conditions provide two sets of input demand functions: one set when L = 0, for non-employers, and the other when L > 0, for employers. The Kuhn-Tucker conditions *(6a)* and *(6c)* therefore imply:

$$f_{e_L} = \frac{-U_e}{(1-t)U_c} \quad \text{if } L = 0,$$

While *(6d)* implies: $f_L = w \quad \text{if } L > 0.$

It is important to notice that when outside labor is employed, taxes only enter the optimization problem through the business owner's effort.

The marginal cost of output is:

$$Min\left[\frac{w}{f_L}, \frac{-(U_e/U_c)}{(1-t)f_{e_L}}\right] = \frac{r}{f_k},$$

So when $L > 0$, *as* $\frac{r}{f_k} \leq \frac{-(U_e/U_c)}{(1-t)f_{e_L}}$ or, as $(1-t)\frac{f_{e_L}}{f_L} \leq or \geq \frac{-(U_e/U_c)}{w}$.

Or, as $(1-t) \leq \frac{f_L}{w} \cdot \frac{-(U_e/U_c)}{f_{e_L}} = \frac{MC_L}{MC_{e_L}}$.

Thus, there is a firm-specific critical value of t such that $L = 0$ if $t < t_c$ *and* $L > 0$ *if* $t > t_c$. Over some range it is possible that e_L, $L > 0$. This will occur when the sum of the marginal costs of all owner managing effort and owner labor effort is less than the wage that would be paid to outside labor:

$$f_{e_m} + f_{e_L} < w^* \qquad (7)$$

The wages paid to outside labor are assumed to be determined in a perfectly competitive labor market.

To distinguish how business owners respond to tax changes, I differentiate Equation (7) with respect to *t*. Recalling that when *L = 0*, owners equate the marginal products of their efforts: $f_{e_m} = f_{e_L}$, I find that:

$$dt = \frac{2U_{e_m}}{(1-t)^2} = 0 \text{ , which is clearly positive.} \qquad (8)$$

Because *dt* is positive, there exists a value of *t* where it is optimal for a business owner to switch from a regime without employed outside labor to a regime employing labor, *L > 0*.

The Kuhn-Tucker conditions *(6a)* and *(6b)* imply: $f_{e_m} = \frac{-U_e}{(1-t)U_c}$, together with *(6c)* this implies that $f_{e_m} = f_{e_L}$, if *L=0*. It follows that the relevant comparative statics are:

$$(1-t)f_{e_m} = \frac{-U_e}{U_c} \quad \equiv \quad MRS_{e,c}$$

$$\text{So,} \quad (1\text{-}t) = \frac{MRS_{e,c}}{f_{e_m}}$$

$$d(1\text{-}t) = -dt = d\left(\frac{MRS_{e,c}}{f_{e_m}}\right)$$

$$dt = d\left[\frac{U_e/U_c)}{f_{e_m}}\right] = d\left[\frac{U_e}{U_c f_{e_m}}\right] = U_c f_{e_m}\left[\frac{\partial U_e}{\partial e}de + \frac{\partial U_e}{\partial c}dc\right]$$

$$dt = \frac{U_c f_{e_m}[U_{ee}de + U_{ec}dc] - U_e[U_c dc + f_m U_{cc}dc + U_{ec}de]}{U_c^2 f_{e_m}^2}$$

An increase in the marginal tax rate is a relative decrease in the price of labor because taxes are applied to business profits and not revenues; however, the after-tax price of

capital and all other inputs have decreased at identical rates. Hence, the relative price of labor is unchanged as a production input but it has changed relative to the price of owner-effort.

Employers: Firms employing outside labor face the Kuhn-Tucker condition that $\lambda_2 = 0$ because L > 0. The firm owner equates his marginal product of managing effort with the marginal product of outside labor: $(f_{e_m} + f_{e_L}) = f_L$ When $e_L=0$, $f_{e_m} = f_L$ and all changes in the demand for labor and capital are determined by scale effects. So,

$$\frac{dL}{dt} = \frac{dL}{dx} \cdot \frac{dx}{de_m} \cdot \frac{de_m}{dt} .$$

I would like to find: $\frac{dx}{de_m} \cdot \frac{de_m}{dt}$, because I know $\frac{dL}{dx}$ (or, at least, $\frac{dL}{dx} \cdot \frac{x}{c} = \theta_{Lx}$).

The business owner's first order condition with respect to managing effort is:

$$U_e + (1-t)U_c f_e = 0, \qquad (9)$$

The total derivative of equation *(9)* is then:

$$U_{ee}de + U_{ec}dc + (1-t)U_c f_{ee}de + (1-t)f_e U_{ce}de + (1-t)f_e U_{cc}dc - U_c f_e dt = 0, \qquad (10)$$

Recalling that, $dc = (1-t)dx$, the total derivative becomes:

$$U_{ee}de + U_{ec}(1-t)dx + (1-t)U_c f_{ee}de + (1-t)f_e U_{ce}de + (1-t)f_e U_{cc}(1-t)dx - U_c f_e dt = 0, \qquad (11)$$

Now, $dx = f_e de$, so equation *(11)* becomes:

$$U_{ee}de + U_{ec}(1-t)f_e de + (1-t)U_c f_{ee}de + (1-t)f_e U_{ce}de + (1-t)^2 f_e^2 U_{cc}de = U_c f_e dt , \qquad (12)$$

From the Kuhn-Tucker conditions *(6a)* and *(6b)*, I have the following:

$$(1-t)U_c f_e + U_e = 0\,,$$

Neither outside labor nor capital vary directly with taxes (*t).*

$$(1-t)U_c f_{ee}de + (1-t)f_e U_{ce}de + (1-t)f_e U_{cc}dc - U_c f_e dt + U_{ee}de + U_{ec}dc = 0\,, \qquad (13)$$

It follows that because *L* and *K* do not vary directly with *t*,

$dc = (1\text{-}t)dx = (1\text{-}t)f_e de$, so by substitution equation *(13)* becomes:

$$\{(1-t)[U_c f_{ee} + f_e U_{ce} + f_e U_{cc}(1-t)f_e] + U_{ee} + U_{ce}(1-t)f_e\}de = U_c f_e dt\,, \qquad (14)$$

And therefore,

$$\frac{de}{dt} = \frac{U_c f_e}{U_{ee} + 2(1-t)f_e U_{ce} + U_{cc}[(1-t)f_e]^2 + (1-t)U_c f_{ee}} \qquad (15)$$

Recall that: $(1-t)U_c f_e + U_e = 0$,

rearranging to solve for f_e yields the following:

$f_e = -\left(\frac{U_e}{U_c}\right)\cdot\left(\frac{1}{1-t}\right)$, substituting into equation *(15),*

the following expression for $\frac{de}{dt}$ is obtained:

$$\frac{de}{dt} = \frac{U_c f_e}{U_{ee} + 2U_{ce}(Mrg\ Cost\ of\ Effort) + U_{cc}[Mrg\ Cost\ of\ Effort]^2 + (1-t)U_c f_{ee}}$$

When owner labor effort is zero (e_L*=0)* the marginal cost of effort is greater than the market wage: *Marginal Cost of Effort > w.*

The corresponding second order condition is:

$$U_{ee} + 2U_{ce} + U_{cc} < 0,$$

To ensure utility maximization,

$$U_{ee} + \mu\cdot 2U_{ce} + \mu^2 U_{cc} + (1\text{-}t) + U_c f_{ee} < 0,$$

Solving for the critical value of μ yields the following:

$$2\mu_c U_{ce} + \mu_c^2 U_{cc} + [U_{ee} + (1-t)U_c f_{ee}] = 0,$$

$$\mu_c = \frac{-2U_{ec} \pm \sqrt{4U_{ec}^2 - 4U_{cc}[U_{ee} + (1-t)U_c f_{ee}]}}{4U_{ce}^2}$$

Simplifying,

$\mu_c = -\frac{1}{2U_{ec}} + \frac{1}{2U_{ec}^2}\sqrt{U_{ec}^2 - U_{cc}[U_{ee} + (1-t)U_c f_{ee}]}$, which is clearly negative.

It is possible that over some range of tax rates between the cases when no outside labor is employed and when owners provide only managing effort that both owner labor effort and outside labor can be positive. This occurs up to the point when the marginal costs of managing effort equal the market wage.

Figure 1.1 displays the optimal owner effort and outside labor choices for any given sole proprietorship. The value of the marginal product of total owner effort is denoted by the downward sloping curve labeled *MP(e).* Depending on the business owner's marginal product of labor, he may or may not employ outside labor in the firm. The two full upward sloping curves represent the after-tax marginal cost of owner effort under no taxes and then the critical tax rate. The upward sloping $MC(e)/(1-t_0)$ curve represents owners who only exert managing effort, have zero labor effort, and employ outside labor. The horizontal axis measures the total amount, or quantity, of owner-effort exerted through managing effort and labor effort. The price, or shadow cost, of owner effort is listed on the vertical axis.

Case 1: Firms with zero wage bills may employ outside labor after a tax increase due to the relative price increase of owner-effort as a productive input. For any given firm, there exists a critical tax rate (t_c) such that $t > t_c$ implies $L > 0$. There is also a

second critical tax rate (t_0) such that $t > t_0$ implies $e_L = 0$ (for simplicity, this is can be depicted in Figure 1.1 as $MC(e)/(1-t_0)$ but could occur anywhere to the left of the marginal cost curve for the critical tax rate). As long as $e_L > 0$, the firm owner simply equates his marginal products of managing effort and labor effort $[MP(e_m) = MP(e_L)]$ during maximization. But if $L > 0$, the owner equates the marginal product of his labor effort with the competitive wage because his labor effort and outside labor are perfect substitutes $[MP(e_L) = w]$. It follows that there is a range of tax rates over which all shifts of the after-tax marginal cost curve can cause a one-for-one substitution of managing effort for labor effort (e_m *for* e_L). Once t_0 is exceeded, represented by $MC(e)/(1-t_0)$, the owner does not exert any labor effort; he equates his marginal cost of managing with the marginal product of managing: $e_L = 0$ *and* $MC(e) = MC(e_m) = MP(e_m) > w$.

For firms originally not employing outside labor, Figure 1.1 shows that production decreases, but the firm owner may substitute outside labor for his labor-effort. When tax rates increase, owner-effort decreases for the firm but the firm's demand for outside labor increases as it moves to a positive wage bill from a previous wage bill of zero. When the critical tax rate is reached or exceeded, owners begin employing outside labor to undertake some of the tasks previously done by the owner. With higher and higher tax rates exceeding the critical rate, owners continue to reduce their labor effort, employ additional outside labor at the tax-deductable wage, and spend more time managing. This pattern continues until the next critical tax rate t_0 is reached at which owners exert only managing effort.

Case 2: Firms with positive wage bills prior to tax increases are denoted by the upward sloping $MC(e)/(1-t_0)$ curve. The firm owners only exert managing effort and upon tax increases, the marginal cost of managing effort increases and owners spend less time managing. Henceforth, all changes in employment and output are due to the scale effect of reduced managerial effort by the owner. After the tax increase, the business owner reduces his demand for outside labor, *ceteris paribus*.

4 Two-Period Intertemporal Production and Tax Avoidance

A static single time-period is convenient to model but unrealistic when individuals and firms seek to maximize utility and profits over many time periods. When this is the case, the decision-maker must account for current tax rates as well as future tax rates. For business owners producing different goods and services, the storability of their product will directly affect their ability to take advantage of relatively low tax rates in some years.[23]

With two periods and non-storable products, firms employing labor strive to produce and sell in the period of relatively low tax rates. Output and the firm's demand for outside labor increase in periods of relatively low tax rates. Referring back to Figure 1.1, firms without employed labor which produce non-storable products utilize only owner managing and labor effort. For firms without employees, periods of relatively high tax rates induce a higher probability of employing labor as owners substitute away from

[23] I assume tax-payers have rational expectations or perfect foresight; henceforth, future taxes are known with certainty and any deviations are random noise.

owner labor effort. Periods of relatively low tax rates imply the firms are less likely to employ because owner labor effort is less costly than wages to potential employees.

Firms producing storable products have a more complicated maximization problem. Augmenting the production function in Section 3 to allow for two time periods, I see that firm owners maximize utility subject to the two-period budget constraint. Utility is an increasing function of consumption and decreasing in effort in both periods.

$$U(c_0, c_1, e_0, e_1) \qquad (16)$$

Consumption in both periods is simply after-tax income where after-tax income in the future period includes the production that was stored from the initial period:

$$C_0 = (1-t_0)M_0 \qquad (17)$$

$C_1 = (1-t_1)M_1$, which can also be stated:

$$C_1 = (1-t_1)[\, f(e_1, L_1, K_1) - wL_1 - rK_1 + S_0]. \qquad (18)$$

Where income in the initial period is simply production less the amount of production (S_0) that is carried forward to sell in the next period:

$$M_0 = f(e_0, L_0, K_0) - wL_0 - rK_0 - S_0] \qquad (19)$$

For the case when future tax rates are expected to decline ($t_1 < t_0$), the owner chooses e_M, e_L, L, K, c_0, c_1, *and* S_0 to maximize utility (*equation 16*) subject to *equations 17 through 19* and the production function, and the nonnegativity constraints $L_0, L_1 \geq 0$. With storable production, the owner's optimization problem becomes:

$$\underset{e_M, e_L, L, K, c_0, c_1, S_0}{\mathcal{L}} = U(c_0, c_1, e_0, e_1) + \lambda_0\{(1-t_0)(1+r)[f^*(e_0, L_0, K_0) - wL_0 - rK_0 - S_0] + (1-t_1)[f^*(e_1, L_1, K_1) - wL_1 - rK_1 + S_0] - C_0 - C_1\} + \lambda_1 L_0 + \lambda_2 L_1 \qquad (20)$$

Taxes enter the optimization problem only through effort and storage of the good. The Kuhn-Tucker conditions are:

$$U_{c_0} = \lambda_0(1+r) \qquad (21a)$$

$$U_{c_1} = \lambda_1 \qquad (21b)$$

$$-U_{e_0} = f_{e m_0}\,(1-t_0)(1+r)\,\lambda_0 \qquad (21c)$$

$$-U_{e_1} = f_{e m_1}\,(1-t_1)\lambda_0 \qquad (21d)$$

$$(1-t_0)(1+r)\,\lambda_0 f_{e L_0} = -(U_{e_0} + \lambda_1), \qquad \text{if } L = 0, \text{ Recall: } \acute{L} = L+e_L \qquad (21e)$$

$$(1-t_1)\,\lambda_0 f_{e L_1} = -(U_{e_1} + \lambda_2), \qquad \text{if } L = 0, (\acute{L} = L+e_L) \qquad (21f)$$

$$f_{L_0} = w \text{ if } e_L = 0 \qquad (21g)$$

$$f_{L_1} = w \text{ if } e_L = 0 \qquad (21h)$$

$$f_{k_0} = r \qquad (21i)$$

$$f_{k_1} = r \qquad (21j)$$

$$-(1-t_0)(1+r)\,\lambda_0 + (1-t_1)\,\lambda_0 \text{ which implies: } \frac{1-t_1}{1-t_0} = 1 + r \qquad (21k)$$

Condition 1 The complementary slackness condition requires $\lambda_2 \geq 0$ (or $\lambda_2 = 0$ if $L > 0$) and requires (e_L, e_m, L) to satisfy $L \geq 0$. If $\lambda_2 > 0$, it must be the case that L = 0.

The Kuhn-Tucker conditions *(21a-21d)* imply:

$$\frac{U_{c_0}}{U_{c_1}} = \frac{U_{e_0}}{U_{e_1}} \frac{f_{e m_1}}{f_{e m_0}} \frac{1-t_1}{1-t_0},$$

which can be rearranged to solve for the marginal rate of substitution of effort and consumption.

$$\frac{U_{c_1}}{U_{c_0}} \frac{U_{e_0}}{U_{e_1}} \frac{f_{e m_1}}{f_{e m_0}} = \frac{1-t_0}{1-t_1}. \qquad (22)$$

Firms not employing outside labor equate the marginal product of owner managing effort to the marginal product of owner labor effort which will always be less than the competitive market wage (*If L=0,* $f_{e_L} < w * and\ f_{e_L} = f_{e_m}$). I simply differentiate $\frac{f_{e_{m_1}}}{f_{e_{m_0}}}$ (*equation 22*) with respect to current period taxes (t_0) and future taxes (t_1) to identify how the relative marginal products change in the two periods when one tax rates increases.

$$dt_0 = -\frac{U_{c_1}}{U_{c_0}}\frac{U_{e_0}}{U_{e_1}}\frac{1-t_1}{(1-t_0)^2} < 0\,. \qquad (23)$$

$$dt_1 = \frac{U_{c_1}}{U_{c_0}}\frac{U_{e_0}}{U_{e_1}}\frac{1}{1-t_0} > 0\,. \qquad (24)$$

Equation 23 shows that for increases in current tax rates, or relative decreases in future tax rates, firms produce in the current period but store the product and sell relatively more in the future when tax rates are relatively low. The marginal product of current effort has declined, or the marginal product of future owner effort has risen.

Equation 24 portrays a similar picture for future tax increases. When future tax rates rise, firms want to produce and sell more today because the marginal product of future effort declines relative to current owner effort. The current and future tax rate comparative statics are identical for both firms with and without outside labor because the effect on owner effort is due to the storability of the product.

5 The Data

Using pooled cross-sectional data, a stratified random sample of all taxpayers in each year is created. Schedule C taxpayers are assumed to respond identically in each year to tax changes, *ceteris paribus*. Reported *wage bill* is used as a proxy for employment because actual employment levels, or the number of employees, are not observed. If firms are less likely to employ labor following tax increases, they should be more likely to employ labor, *ceteris paribus*, under tax rate decreases.[24]

The data reported on a Schedule C include the aggregate revenues, expenses and net income from the business endeavors of sole proprietors.[25] Schedule C filers can, and legally should, include "odd-job" income from people without formal business names or practices.[26] In 2007, 23.1 million returns included a Schedule C filing.[27] Schedule C entities represent about 70% of all IRS documented businesses over 1988-2007.[28]

Historically, around 70% of Schedule C filers have no wage bills; in 2007, salaries and wages accounted for 12.8% of all expenses. The largest expense by aggregate small business filers is "Other Business Deductions", representing almost 25%

[24] Note: I am never assuming firms behave symmetrically to tax increases and decreases.

[25] Schedule C does not include data for S-Corporations and some LLCs. Single member Limited Liability Corporations (LLCs) can elect to file a Schedule C. In 2005, of the Schedule C filers, roughly 450,000 were registered LLCs. Multi-member LLCs are type of partnership and file a Schedule E under Partnership Income.

[26] For example, an economics professor files a Schedule C to report consulting income but is not technically filed with the Secretary of State as a business. This also includes goods sold on eBay; however, it typically behooves the seller to not file the Schedule C and avoid reporting the income, particularly when the transactions are difficult to track.

[27] If a taxpayer owns several businesses, a Schedule C is filed separately for each business.

[28] C-corporations are included in the aggregate IRS business filings. The number of C-corporations drops from about 12% in 1988 to 5.8% of all filers in 2007. The number of S-corporations rises from 6.6% to 12.5% for 1988 and 2007, respectively.

of total expenses.[29] This category includes resource depletion, employee benefit programs, legal and professional services[30], pension and profit-sharing plans, meals and entertainment, and home-office business deductions. If tax evasion increases at an increasing rate with higher taxes, the incentive to overstate expenses or understate revenues will bias employment and wage bill observations and coefficient estimates towards zero.

My analysis will focus on Schedule C data and taxpayer characteristics.[31] Data come from the NBER Public Use File on Individual Income-tax Returns from 1992-2005. Each year of data provides a 10% stratified random sample of unaudited and unamended tax returns. High-income households are oversampled and there are no missing values in the dataset[32]. All upper-income returns that are sampled at greater than 10% are sub-sampled at 10% to further protect taxpayer identity.[33] Cross-sectional data capture population changes over time and avoid survival biases associated with a balanced panel.

Using returns only as far back as 1992 is important for several reasons: taxable income is defined differently before 1987 (Old Concept) and after 1987 (New Concept),

[29] Source: http://www.irs.gov/pub/irs-soi/09sumbulsolprop.pdf

[30] Legal and professional services include private contractors.

[31] Schedule C data have limited personal characteristic variables; however, the data are rich in income and expense variables.

[32] For each year, all of the extreme value AGI filers are not included in the sample because there would be a 10% chance of selection for each filer. Because of the extreme value omissions 45 filers for 2005 are not sampled.

[33] For all filers with AGI greater than $200,000 several codes are completely removed: State Codes, Alimony Paid/Received, and State Sales Tax Deduction. This applies to roughly 25% of firms employing labor and 6% of firms without labor. Marital Status and number of dependents are also modified. For high AGI filers, returns are further modified: the Schedule C fields for salaries and wages, state income-taxes, and real estate taxes are blurred by multivariate blurring when two of the three categories have nonzero numbers. Multivariate blurring is applied to each of the three categories after sub-grouping, the observation is averaged with the two observations closest to it and then the field is replaced with the average value. It is important to remember than one observation never contains the full content of the return and often includes data from more than one return.

"salaries paid to employees" is not included in the dataset until 1987, and the effects of the 1986 reforms could linger for several years. Post-1986 data avoids changes in the definition of the taxable-base, thereby allowing a consistent definition of taxable income and cleaner variation presented by the 1993 and 2003 tax reforms.[34]

Taxpayers filing only Schedule E are also excluded because the dataset does not provide any information on salaries or employment for such entities.[35] Taxpayers receiving social security income are dropped from the dataset because potential retirees may operate businesses differently than do non-retirees.[36] Observations with positive AMT[37] liabilities are excluded because they face different marginal and statutory tax rates than peer filers.[38] Unlike prior literature, all business entities are included, not merely those that are profitable.[39] These observations contain valuable information if business losses are one form of sheltering taxable income.[40] Henceforth, for this analysis, loss entities are considered an equilibrium condition, though the results are not affected when the observations are omitted.

[34] Furthermore, the data begin in 1992 in order to mitigate any changes in behavior still occurring from the 1986 rate changes and base changes. Results are not sensitive to including the additional years of 1990 and 1991.
[35] Schedule E includes business income from partnerships and s-corporations.
[36] Approximately 50,000 observations are omitted. This is consistent with the literature, if the business is a hobby, the retiree may be less responsive to incentives, or if the owner is preparing to sell or leave the business, behavior may be atypical.
[37] AMT stands for "Alternative Minimum Tax": approximately 2000 observations in each year, or 6% of remaining observations are deleted because of the AMT.
[38] Taxpayers with AMT liabilities do not pay the statutory rates listed in the IRS tax tables.
[39] Loss-entities could serve as a tax-sheltering vehicle but presently past researchers and myself have no way of distinguishing between legitimate businesses and tax-shelters in the dataset.
[40] A Schedule C is filed for each business. A taxpayer may file one or several Schedule C's. Taxes are paid on the net position of all the businesses because the losses of one business offset the taxable income of profitable businesses.

5a Data: *Summary Statistics*

Selected summary statistics for the data are presented in Table 1.1a and 1.1b. The average marginal tax rate over all 402,651 Schedule C filers in the sample is 21.6% but is 22.65% for filers employing labor.[42] On average, statutory tax rates decrease slightly over the time period: the average future tax rate for all firms is 20.65%. Small-business owners have an unconditional average annual wage bill of $70,397 that varies significantly over filers, with a standard deviation of $380,083. Sample wage bills range from $0 to $49.8 million, with a 26.57% probability of having a positive wage bill. For employers, the mean wage bill is significantly higher at $264,914 with a standard deviation of $701,504. Such a large variance suggests that truncation is likely and that a truncated model could outperform a standard model for the data.

Not surprisingly, Schedule C filers report much higher adjusted gross incomes than the average population. With mean AGI of $746,074 and a standard deviation of $4.1 million the data provide much variation over income: ranging from -$337 million to $534 million. These businesses receive up to $2.36 billion in Schedule C Receipts with a mean of $730,894 and standard deviation of $10.1 million. Taxable business income ranges from -$140 million to $50.9 million with a mean of $91,812 and a standard deviation of $625,028.[43]

[42] All dollar figures are adjusted for inflation and stated in 2005 real dollars.

[43] Losses can occur for a number of reasons including: start-up costs, large capital expenditures or depreciation. Start-up costs were limited to $5,000 in excess of revenues for 2009; anything in excess of that is amortized over the next 15-years.

The raw correlations of the wage bill and the current tax rate and the future tax rate are 0.145 and 0.147, respectively. The current marginal tax rate and the future marginal tax rate are highly correlated with a raw correlation of 0.94.

6a Empirical Analysis Allowing for Intertemporal Substitution of Owner Effort

My interest lies in the probability of a firm employing labor and the firm's level of employment. The Heckman 2-step model uses information on both businesses employing labor (employers) and businesses not employing labor (non-employers) to estimate the conditional wage bill elasticity. It allows for the presence of a limited dependent variable (employing labor) and correlated processes for choosing to employ and then the level of employment, conditional on having chosen to employ.

My goal is to identify the two distinct effects of changes in current tax rates and future tax rates on both the probability of employing labor and total employment. The theoretical framework presented in Section 3 shows that both the probability of employing labor and the wage bill depend on the specifics of the production function with respect to owner labor-effort, managing-effort and employment of outside labor, as well as the optimal scale of the firm.

The decision to employ labor is made once some threshold is passed. This threshold will depend on the managerial skill of the business owner; the costs associated with employing any labor: the administrative burdens of payroll, employee taxes, current and future tax rates, and access to lines of credit to maintain payroll. When the threshold is reached, the firm employs labor and must then decide how much labor to employ. If

firms take equilibrium wages as given, the amount of labor employed varies directly with the wage bill variable.

The amount of labor employed depends on many of the same variables included in the employment decision; however, variables that affect only the fixed costs of employing labor are not included. The two decisions are very closely related, so a flexible framework is needed to allow for any correlation between the two decisions. The Heckman selection model allows for precisely such flexibility.

The first step is to estimate the change in the probability of employing labor, which is explained by the following probit model:

$$y_i^* = \beta_0 \tau_{i,t} + \beta_1 \tau_{i,t+1} + \boldsymbol{X'}\beta + \varepsilon_i \text{ , where } y_i = \begin{cases} 1, & y_i^* > 0 \\ 0, & otherwise. \end{cases} \quad (1)$$

The parameter, β_0, measures the contemporaneous effect of current tax rate changes while β_1 estimates the anticipatory effect of tax rate changes in the next year. The future tax rate parameter, β_1, reflects the ability to shift income (Revenue-Expenses) across consecutive tax periods. Empirically, the future tax rate may or may not be certain but I assume tax-payers have rational expectations; henceforth, future taxes are known with certainty and any deviations are random noise. The data report actual tax rates as proxies for expectations. Tax reforms can induce both contemporaneous and anticipatory effects. All tax rates are statutory rates which serve as exogenous proxies for marginal tax rates.[44]

The **X**-vector includes variables thought to influence the firm's decision to employ outside labor. The vector β is the conformable parameter vector for the covariates. Capital income (the sum of interest and dividends) and personal property

[44] For more discussion on the effective marginal and statutory rates refer to Section 2.

taxes are used to proxy for a taxpayer's assets which may affect a business owner's labor supply, ability to re-invest in the firm and obtain outside financing.[45] Capital income and personal property taxes are included to reflect the capital constraints facing the business. Firms with larger capital stocks will find it easier to obtain loans and lines of credit to fund payrolls.

Depreciation is observed for each Schedule C and serves as an industry proxy because some industries with large depreciation expenses (manufacturing) are less labor-intensive than businesses with small depreciation expenses (consulting or law), which could affect the firm's labor-demand.[46] The number of dependents (exemptions) and marital-status proxy for the business owner's preferences for consumption, labor and leisure. Two indicator variables for the presence of other businesses (partnerships and S-corps filed on a Schedule E, and farms filed on a Schedule F) and the amount of Schedule E income are also included in the selection equation[47].

[45] My proxy for capital income, is a very poor measure of tax-payer wealth but as in previous research, is included as a proxy for the ease of funding: for example, a business owner with large amounts of capital income will receive more offers and lower interest rates from potential lenders than a business owner with limited assets to pledge as collateral. Interest and dividend income is used because such sources are considered more stable than capital gains. Capital gains fluctuate much more than other measures of access to capital and are also very sensitive to capital gains (losses) tax rates and laws. See Feldstein (1997) for a detailed analysis.

[46] Depreciation expenses could be a lagged or jointly-determined variable given both capital and labor are required for production. However, most small firms do not depreciate any assets. For firms with depreciation expenses, any changes in response to current and future tax rates will be very small relative to a firm's total depreciation expense or capital expenditures because depreciated property is typically written off over 5-39 years and not taken until the asset is "ready and available for use". Automobiles are typically depreciated over five years while nonresidential property is depreciated over 39 years. I follow past research and include depreciation because I think the benefits outweigh the costs. See http://www.irs.gov/publications/p946/ch01.html#en_US_2010_publink1000107327 for a full discussion.

[47] Schedule E firms are typically owned by one to three people. The S-corporation classification allows up to 100 shareholders; however, S-corporations with more than ten shareholders constitute only 0.06% of all S-corporations.

The indicators for other businesses reflect the threshold effect of employing labor.[48] Employing labor includes fixed costs that must be borne by the owner: familiarizing oneself with a payroll system, and learning and maintaining labor-specific regulations and administrative up-keep. Once an owner has undertaken such costs once, it is virtually costless to apply the knowledge to other enterprises.[49] The variable for the level of Schedule E income allows for the success (or loss) of one business to potentially flow through to the other firm operated by the same taxpayer.[50]

The independent variables are used to estimate the inverse Mills ratio which is then used as a variable in the second stage. Consistent with previous literature, state-level fixed effects are not used because 25% of all firms employing labor do not possess a state indicator variable due to blurred data on high-income taxpayers. Omitting the blurred high-income observations to model the State-level fixed-effects substantially skews the results.

The second stage regression includes only the variables in **X** that directly affect the magnitude or level of employment and not the decision to employ. The second stage regression also includes the inverse Mills ratio from the first stage to account for any selection on unobservables by employers:

$$y_i = \beta_0 \boldsymbol{\tau}_{i,t} + \beta_1 \boldsymbol{\tau}_{i,t+1} + \beta_2 \boldsymbol{X} + \varepsilon_i \qquad (2)$$

[48] It would be nice to include an indicator only if labor is actually employed in the other business; however, my data do not provide wage bills for the Schedule E or the Schedule F.

[49] For example, if a taxpayer runs a seasonal farm and files a Schedule F as well as a Schedule C for another business, that taxpayer has already forgone the fixed costs associated with employing labor because farms are relatively labor-intensive. This lowers the initial fixed cost of employing labor in the Schedule C business.

[50] This relationship need not be positive, though it could be: a firm owner with one successful enterprise may be more or less likely to have success in a second endeavor.

The vector X_i includes the same variables included in the probit model but excludes the indicator variables for other businesses, because the variables only affect the decision to employ and not the level of employment. The Schedule E and F indicator variables are the only variables omitted from the second stage regression; this also ensures full identification in the Heckman model.

The current tax rate, future tax rate, capital income, personal property taxes, depreciation expenses, number of dependents, marital status, and the level of Schedule E income constitute X_i. As in the probit model, the coefficients on the two tax variables are separately identified to estimate the impact of contemporary and anticipatory firm responses. The coefficient on the current tax rate reflects contemporaneous behavior responding to current period changes. The effect of a change in the future tax rate is important because it affects business owners' labor-leisure decisions in the current year and reflects their ability to shift income (output) across two periods. This implies the short-run response is larger than the long-run response. *Ceteris paribus*, an increase in the future rate signals that employed labor will be relatively less valuable as a production input in the future than in the present. Decreases in the future tax rate signal that employed labor is relatively less valuable in the current year than in the future year. The parameter β_1 reflects the incentive of business owners to adjust the timing of their own labor, revenues and expenses across time periods to take advantage of relatively low tax rates, or to avoid relatively high tax rates.

6b Estimation

For the full sample of observations in 1992-2005, the Heckman model estimates are reported in Table 1.2. Column 1 displays the marginal effects from the probit model.[53] Estimates over the entire time period (1992-2005) provide a local average treatment effect for small business employment and wage bill decisions responding to marginal tax rate changes.[54] Employment and wage bill estimates will be biased towards zero when higher tax rates induce tax evasion and miss-reporting because owners have the incentive to reduce employment but overstate the wage bill.[55]

The marginal effects of interest show that a one percentage point increase in current tax rates increases the probability of employing outside labor by 1.18%. This represents the contemporaneous response of business owners to current period tax changes. A one percentage point increase in the marginal tax rate next year decreases the probability of employing labor today by 0.70%.[56] The opposite signs on the two tax coefficients relay very different behavioral responses. In the short-run, reflected by current tax rate changes, owners decrease their own labor effort and switch to monitoring outside labor. Conversely, future tax rate changes induce slowed production in the firm and a decrease in the firm's demand for all factors of production: employed labor, capital and owner effort.

[53] The observations are distributed evenly through the years with roughly 19,500 observations per year.
[54] See Figure (5) for exact tax rate changes.
[55] The wage bill, or wage bills, is a tax-deductable business expense.
[56] At first glance the large negative correlation coefficient in the Heckman analysis may seem unusual; however, it simply states that for firms with low probabilities of employing labor, holding the observable variables constant, if the unobservable characteristics increase the firm's probability of employing labor then the firm is likely to have a low wage bill if they actually do employ labor. A similar story can be told for firms with high probabilities of employing labor while holding observed characteristics constant.

The second stage regression in Column 3 shows that a one percentage point increase in the current tax rate reduces the mean wage bill by $7,678; whereas a one percentage point increase in the future tax rate increases the mean wage bill by $8,707. Given firms take market wages as exogenous, the results from the first and second stages imply that current-period tax increases reduce average wage bills because of lower production and because more owners are going to employ outside labor when the price of outside labor drops relative to the price of owner labor.

Consistent with the two-period model in Section 4, increases in future tax rates make production today more attractive relative to production tomorrow; hence, firms employ more people to boost current period production and shift away from the next period's relatively high taxes. Relatively high marginal tax rates in future periods imply owners' labor effort is relatively less valuable tomorrow than it is today: more leisure is consumed in high tax periods and the owner's managerial effort and employed labor are complements.[57]

The mean and median wage bill elasticities with respect to current tax rate changes are -0.17 and -0.64, respectively. The future tax rate elasticity is 0.18 for the mean and 0.65 for the median. These estimates differ from those by Carroll et al. (2000a), 0.37 for current tax changes, and LaLumia (2008) found insignificant estimates.

Operating another business (limited liability) or farm, which suggests that the fixed costs of employing labor have already been borne by the owner, increases the

[57] The time horizon of observations is important to capture the behavioral effects. For this analysis, including two periods is all that is feasible.

probability of employing labor in the sole proprietorship by 7.86% and 12.57%, respectively. A $100,000 increase in depreciation expenses increases the probability of employing labor by 25.7%. In the second stage (Column 3), a $1 increase in capital income, depreciation and business income earned outside the sole proprietorship, increases wage bills by $0.22, $0.34 and $0.03, respectively.

None of the estimates reported in Table 1.2 differ appreciably between the linear and logarithmic specifications. The natural-log specification yields virtually identical estimates and thus, are not reported. Furthermore, the density for the logarithm of wage bills is approximately normal, justifying the Heckman assumption of normality. Figure 1.2 shows the kernel density for wage bills for all observations with firms employing labor. The median wage bill of $264,914 for firms employing labor implies 50% of the distribution occurs well below the sample mean of $89,790.

6c Behavioral Differences by Firm Size

Segmenting the data by gross business receipts lends insight to how differently sized firms respond to tax changes. There are noticeable differences in the data around $250,000 and $3.5 million in gross receipts. As shown in Tables 1.3a and 1.3b, small, medium and large firms respond differently to tax changes.

The probit analysis in the upper half of Table 1.5 shows medium to large firms are more likely to contemporaneously respond to current tax increases by employing outside labor and reducing owner labor effort. Medium and large firms are also more likely to reduce production when future tax rates increase. Firms with gross receipts in excess of

$3.5 million are 6.66% less likely to employ labor in the current period if the tax rate is known to increase one percentage point next period.

As expected, the coefficient signs are positive on the farm indicator for all firm sizes but the changing sign on the indicator for other businesses (limited liability firms and S-corporations) is worth noting. Firms with gross receipts of $250,000 or less are 9.63% more likely to employ labor when another business is present. Medium and large firms are respectively 15.66% and 7.37% less likely to employ when another business entity exists. The main difference among the firms is the type of business filing the Schedule C in a given gross receipt range. My data do not include industry classification, but in the aggregate report produced by the IRS high gross-receipt firms are more likely to include consultants, financial services (insurance, securities brokers, investment banking), and professional sciences than smaller firms which are largely comprised of construction, real estate and leasing, and wholesale and retail trade.[58]

The second stage estimates suggest that medium and large firms are more likely than small firms to shift production to periods of relatively low tax rates, as evidenced by the large positive wage bill coefficients on future tax rates.

Table 1.3b summarizes elasticity estimates for firms with differently sized gross receipts. The results support Figure 1.1 previously depicted in Section 3 with regard to current tax changes. Small firms are not as likely as large firms to employ outside labor; small firms are likely to rely solely on the owner's labor-effort prior to tax increases. Current-period tax increases decrease the relative price of outside labor versus owner-

[58] See http://www.irs.gov/taxstats/indtaxstats/article/0,,id=134481,00.html for industry data in each year.

effort for small and marginal firms, which do indeed employ more outside labor. Large firms, which are more likely to employ labor initially, cut production and demand for all inputs when current period taxes increase.

Medium and large firms respond similarly to future tax changes, but large firms react more to current tax changes. Large firms have a median wage bill elasticity of -0.20, whereas small firms have a wage bill elasticity of -5.41 with respect to future tax rates, suggesting their production is very sensitive to market expectations and growth incentives.

7 Elasticity Estimates for the Specific Reforms of 1993 and 2001-2003

The nature of the OBRA-93 and EGTRRA are very different with OBRA-93 only increasing marginal tax rates on high income-taxpayers and EGTRRA reducing tax rates on all income brackets. EGTRRA was phased in gradually over three years, whereas OBRA-93 occurred in a single tax year. These structural differences could affect taxpayer behavior and elasticity estimates. Elasticity estimates are presented in Table 1.4 for the individual tax reforms, OBRA-93 and EGTRRA and JGTRRA in 2001-2003. Roughly 30% of firms employed outside labor during 1992-1994 as seen in Column 1. Only 25% of observations employed labor in the 2001-2005 sample. The mean and median wage bill elasticities for the 1993 current tax increases are -0.47 and -0.60, respectively. The wage bill elasticity with respect to future tax rates is 0.12 at the mean. The 2001-2005 elasticity estimates reflect more modest responses at -0.27 and -0.31 for the mean and median, respectively. The mean future tax rate elasticity is 0.10 for the 143,054

observations in 2001-2005. The relatively modest estimates for EGTRRA may reflect the gradual nature of the tax reform.

I notice a general decline in the probability of employing labor over time in the sample. This could be due to the rise in popularity of the S-corporation and the decline of Schedule C filers. The decline in employment could be a symptom of the changing business environment with more one-man shops opening due to the rise of the Internet. The kernel densities in Figure 1.3 and Figure 1.4 suggest the former explanation is more likely to be supported by the data. The wage bill kernel density estimates for the two time periods look very similar with the exception of firms with wage bills in excess of $5 million. Each year contains approximately the same number of observations but firms with large wage bills appear to be dropping out of the sample between 1994 and 2001. Firms with larger wage bills may be opting for S-corporation status and filing Schedule E instead of Schedule C. As shown in Figures 1.3 and 1.4, employers in 1992-1994 were more evenly distributed over the $5 million to $30 million range. In 2001-2005, the majority of employers fall in the $5 million to $10 million range.

Tax-return data only provide wage bills for Schedule C filers; hence, the estimates reflect only sole-proprietorships and single-owner LLCs. To the extent these businesses are similar to S-corporations and partnerships, the results provide an accurate estimate of the employment effects of small businesses. S-corporations tend to be larger than other small business entities whereas most service businesses (doctors, lawyers, dentists) file as partnerships and limited liability corporations. Because of the preferential treatment given to S-corporations under the 1986 tax reforms, the entity has continued to rise in

popularity. Future research may want to investigate the behavioral and labor decisions of S-corporations with respect to tax rate changes.

8 Omitted Variable Bias: Implications of Excluding Future Tax Rates

Table 1.5 compares a Heckman model with both current and future tax rates to a Heckman model with only current tax rates in Columns 1 and 2, respectively. Including only current tax rates biases the marginal effect on employing labor upwards in the first stage, as shown in Column 2 where a one percentage point change in current tax rates implies firms are 5.02% more likely to employ outside labor.

Excluding the future tax variable results in a positive coefficient in the second stage for wage bills instead of the negative coefficient reported in Column 1. Marginal effects and coefficients for the other independent variables change little when future tax rates are excluded. Column 3 reports the least-squares regression using both future and current tax rates. Column 4 omits the future-tax-rate regressor but is otherwise identical to Column 3. Column 4 is most similar to the methodology employed by Carroll et al. (2000a) and LaLumia (2008). The first stage is a probit model independent of the second stage, which is a least-squares regression on only observations with positive wage bills.

The bias occurs from estimating the entire behavioral effect as contemporaneous instead of decomposing the response to also account for the anticipatory effect. Omitting future tax rates as an explanatory variable induces an omitted variable bias that skews the interpretation of the current and future tax rate coefficients and marginal effects but leaves the other coefficients unchanged.

Recall that my Heckman estimates reported in Table 1.2 report a median wage bill elasticity with respect to current tax rates of 0.65. For comparison, Carroll et al. (2000a) estimated a median wage bill elasticity of 0.37. Carroll et al. (2000a) estimated that a marginal tax increase of 1% decreases the mean probability of hiring workers by 1.2% for a balanced panel in 1986 and 1988. LaLumia (2008) used five-years of panel-data beginning in 1999 and did not find any results of statistical significance for the probability of hiring labor or changes in wage bills. LaLumia (2008) explains that observation weighting and the nature of the two tax reforms accounts for the difference between her estimates and those by Carroll et al. (2000a). The 2001 reforms reduced the tax rates in every bracket but the 1986 reforms focused only on the top income bracket and also broadened the taxable base. Similar to my data, Carroll et al. (2000a) use data with oversampled high-AGI taxpayers whereas LaLumia (2008) uses unweighted data.

9 Specification Testing: The Bias of OLS on Positive Wage Bill Observations

The Heckman specification allows for the possibility of unobserved differences between employers and non-employers. Some owners are more likely to employ workers because of the nature of their business. For example, a cleaning business is more likely to have staff employees than an economic consultant or a tax accountant. Furthermore, business owners with better managerial skills are more likely to employ outside labor and are likely to employ more workers than a poor manager. The Heckman allows for such possibilities and estimates the relationship. The assumption of independence used by Carroll et al (2000a) and LaLumia (2008) implicitly assumes all business owners are

equally efficient managers. Independence also assumes all firms, regardless of industry affiliation and size, are equally likely to employ. My theoretical model and empirical results find the assumption of independence unrealistic.

Table 1.6 summarizes results from the truncated and standard OLS regression and contrasts the estimates with the tobit and Heckman specifications. Column 1 restates the second stage estimates from the Heckman results reported in Table 1.2.

The tobit model in Column 2 assumes both the participation and spending equations are drawn from the same distribution with identical covariates. Tobit estimates are presented as a specification test. Similar to the Heckman specification, the tobit allows for correlation between the two equations but imposes strict assumptions about the type of relationship.

The tobit is nested in the Heckman as the special case when the correlation coefficient, rho, equals 1. This assumes the selection and expense decisions are perfectly correlated. The tobit estimates for current and future marginal tax rates are $6,810 and -$2,391, respectively, which differ dramatically from the Heckman estimates of -$7,678 and $8,707. The tobit estimates often have different signs than the Heckman estimates; this is indicative of the positive relationship assumed in the tobit model instead of the estimated correlation of -0.95.

A likelihood ratio test examining the Heckman and tobit model fails to reject the null hypothesis that the Heckman is the true model at 0.01%; therefore, the Heckman model is preferred to the more restrictive tobit.

Columns 3 and 4 show the different covariate estimates for a least-squares regression on positive wage bill observations and a standard least-squares regression on all observations. As mentioned earlier, truncated data with a large variance are typically analyzed efficiently using a truncated model instead of standard OLS. As expected, standard OLS is outperformed by least-squares estimation on only positive observations.

Standard OLS in Column 3 weights employers and non-employers equally and shows the mean result of a tax change on the entire sample. Past research estimates a probit model for the probability of employing labor that would be identical to the first stage estimates in the Heckman model. For the wage bill response, past research simply performs OLS on positive wage-bill observations, this method is displayed in Column 4. The Column 4 estimates are calculated under the false assumption of no correlation between the selection and wage bill equations. Least-squares estimation on positive observations assumes that the two decisions are independent, whereas the Heckman model allows for independence while accommodating potential correlation. The least-squares method biases the estimates towards finding no result. Failing to account for employer selection on unobservables produces very different estimates with much lower magnitudes and sometimes opposite signs.

10 Conclusion

Changes in tax rates have intertemporal effects. Focusing only on contemporaneous adjustments underestimates the true behavioral responses of business owners to tax changes. My analysis has decomposed the total effect of changing tax rates

into two important parts: current responses and preparations for the future. The future-tax coefficient provides an estimate for the ability to shift income and entrepreneurial effort across consecutive tax periods. Modeling separate tax rates helps to separate the contemporaneous responses to current tax changes from the anticipatory reactions to future tax changes.

Using pooled cross-sectional tax return data from 1992-2005, I estimate the small business probability of employing labor and employment level for Schedule C filers with respect to statutory tax-rate changes. Economic theory predicts that small businesses using productive inputs of owner-effort, labor and capital may be more or less likely to employ labor after tax increases due to the relative price increase of owner-effort and the substitutability of owner-labor and tax-deductable outside labor.

My findings support the theoretical model that employing labor involves variable wage and monitoring costs, in addition to the fixed costs of payroll systems and administration. From the probit estimates of the Heckman 2-step analysis, a one percentage point increase in current tax rates increases the probability of employing outside labor by 1.18 percent. This represents the contemporaneous response of business owners to current period tax changes. A one percentage point increase in the marginal tax rate next year decreases the probability of employing labor today by 0.70 percent.

In the short-run (reflected by current tax rate changes), owners decrease their own labor effort and switch to monitoring outside labor. Conversely, future tax rate changes induce slowed production in the firm and a decrease in the firm's demand for all factors of production. The mean and median wage bill elasticities with respect to current tax

rates are -0.17 and -0.64, respectively. The comparable elasticities with respect to future tax rates are 0.18 for the mean and 0.65 for the median. These estimates are almost double the largest estimates reported in the previous literature.

Given that wages paid in the labor market are competitive, the results from the first and second stages together show that current-period tax increases reduce average wage bills because of lower production, while some owners substitute toward hired labor when its price drops relative to the price of the owner's own labor. Increases in future tax rates make production today more attractive relative to production tomorrow, indicating that firms anticipating higher future taxes shift production intertemporally.

Table 1.1a
Summary Statistics for Schedule C Taxpayers 1992-2005

Summary Statistics include the median, mean, minimum and maximum for observations employing labor, and those not employing labor, for all years included in the dataset.

Variable	Median	Mean	Std. Dev.	Minimum	Maximum
Marginal Tax Rate (τ)	27.00%	21.60%	14.43%	0%	39.60%
Future Marginal Tax Rate (τ+1)	25.00%	20.65%	15.21%	0%	39.60%
Probability of Employing Labor	0%	26.57%	44.17%	0%	100%
Wage Bill	$0	$70,397	$380,083	$0	$49,800,000
Adjusted Gross Income (AGI)	$90,443	$746,074	$4,134,146	-$337,000,000	$534,000,000
Gross Receipts (Schedule-C)	$49,180	$730,894	$10,100,000	-$3,079,748	$2,360,000,000
Depreciation	$133	$17,527	$121,255	$0	$19,000,000
Capital Income	$1,001	$65,230	$541,515	$0	$79,600,000
Taxable Business Income (Schedule-C)	$9,005	$91,812	$625,028	-$140,000,000	$50,900,000
Observations	402,651				

Note: Gross receipts are negative due to firms electing to use accrual accounting methods.

Table 1.1b
Summary Statistics for Schedule C Taxpayers Conditional on Employing, or not Employing, Labor 1992-2005

Summary Statistics for employers are substantially larger than for non-employers, particularly for median and mean AGI, gross receipts, depreciation and taxable Schedule C business income. Schedule C businesses with large gross receipts but not employing labor include firms in consulting, finance and insurance, and professional, scientific and technical services.

Variable	Median	Mean	Std. Dev.	Minimum	Maximum
Conditional on Employing Labor					
Marginal Tax Rate (τ)	28.00%	22.65%	14.14%	0.00%	39.60%
Future Marginal Tax Rate (τ+1)	27.50%	21.47%	15.07%	0.00%	39.60%
Wage Bill	$89,790	$264,914	$701,504	$1	$49,800,000
Adjusted Gross Income (AGI)	$118,068	$437,067	$3,854,542	-$337,000,000	$440,000,000
Gross Receipts (Schedule-C)	$621,010	$1,628,747	$6,653,973	-$2,714,034	$1,120,000,000
Depreciation	$10,835	$45,042	$179,785	$0	$14,600,000
Capital Income	$1,343	$47,506	$531,592	$0	$79,600,000
Taxable Business Income (Schedule-C)	$63,312	$191,003	$758,471	-$63,600,000	$43,200,000
Observations	106,999				
Conditional on not Employing Labor					
Marginal Tax Rate (τ)	25.00%	21.22%	14.51%	0.00%	39.60%
Future Marginal Tax Rate (τ+1)	15.00%	20.36%	15.25%	0.00%	39.60%
Wage Bill	-	-	-	-	-
Adjusted Gross Income (AGI)	$79,472	$857,907	$4,225,226	-$246,000,000	$534,000,000
Gross Receipts (Schedule-C)	$20,565	$405,956	$11,100,000	-$3,079,748	$2,360,000,000
Depreciation	$0	$7,569	$89,179	$0	$19,000,000
Capital Income	$855	$71,645	$544,921	$0	$75,300,000
Taxable Business Income (Schedule-C)	$4,796	$55,914	$564,799	-$140,000,000	$50,900,000
Observations	295,652				

Note: Gross receipts are negative due to firms electing to use accrual accounting methods.

Table 1.2
Heckman Selection 2-Step Estimates for Schedule C Business Owners 1992-2005

Columns 1and 3 display results from the Heckman Selection 2-step model for employment and wage bill responses to changing tax rates. Column 1 displays the marginal effects from the first-stage of the Heckman estimation (a probit model). All marginal effects in Column 1 are changes in the probability of employing labor for a one-unit change in the independent variable. A current tax increase of 1 percentage point increases the probability of employing labor in the current period by 1.18%. All dollar denominated variables are in $100,000s so a $100,000 increase in Capital Income, decreases the probability of employing labor by 1.16%. Running another business, whether an S-corp or a farm, increases the probability of employing labor by 7.86% and 12.57%, respectively. For the second-stage presented in Column 3, all coefficients show the dollar increase in the wage bill for a 1 unit change in the independent variable, given the firm employs labor. Conditional on employing labor, a 1 percentage point increase in the current tax rate decreases wage bills by $7678.47, reflecting the scale effect of lower production at higher marginal tax rates. The positive coefficient on the future tax rate reflects the intertemporal substitution as labor and production become relatively more valuable today and less valuable tomorrow when tomorrow's tax rates are expected to increase. A $1 increase in Depreciation Expenses increases salary expenses by $0.34. Mean and median elasticities are reported for each specification. Controls for the marital status, number of dependents, and property taxes are also included. The Wald Test is significant at 0.01%.

	(1)	*(2)*	*(3)*	*(4)*
Independent Variables	*Heckman First-Stage Coefficient*	*Standard Error*	*Heckman Second-Stage Coefficient*	*Standard Error*
Current Tax Rate	**1.18*** **	*(0.04)*	**-7,678.47*** **	*(538.44)*
Future Tax Rate	**-0.70*** **	*(0.04)*	**8,707.42*** **	*(491.92)*
Capital Income	-1.16***	*(0.06)*	0.22***	*(0.01)*
Depreciation	25.70***	*(0.20)*	0.34***	*(0.03)*
Non-Schedule C Business Income	0.36***	*(0.02)*	0.03***	*(0.00)*
Other Businesses: Indicator	7.86***	*(0.47)*	-	-
Other Business: Farm Indicator	12.57***	*(0.86)*	-	-
Constant	-2.21***	*(0.08)*	2,811,514***	*(137586)*
Correlation Coefficient (ρ)	-0.95			
Likelihood Ratio	20,289			
R^2	0.044			
Wald Test (prob>chi^2)	3734.9***	*(0.00)*		
Observations	402,554		402,554	
Wage Bill Current Tax-Rate Elasticity				
Mean Elasticity			-0.17	
Median Elasticity			-0.64	
Wage Bill Future Tax-Rate Elasticity				
Mean Elasticity			0.18	
Median Elasticity			0.65	

Note: All std. errors are adjusted standard errors. (***) indicated significance at 0.01%. Elasticities are average point-estimates that use the mean or median salary expense, respectively.

Table 1.3a
Behavioral Differences by Firm Size as Measured by Gross Business Receipts

The overall dataset on Schedule-C business filers is divided by the level of gross business receipts. Heckman estimates for observations with gross business receipts under $250,000 are presented in Column 1 while companies with receipts of at least $250k but less than $3.5million are in Column 2 and those with receipts of $3.5million and up are presented in Column 3. The three columns relay that differently sized firms do in fact respond differently to personal income tax changes. Larger firms are much more sensitive to changes in tax rates than small firms. Larger firms are also more likely to time production by intertemporally substituting away from producing in years of relatively high tax rates, as evidenced by the positive coefficients on Future Tax Rates in Columns 2 and 3 for the second stage Heckman estimates. For permanent tax increases (the coefficient on current marginal tax rate), small firms are dominated by the change in the relative price of owner-effort and actually increase employment; whereas the decreased production by larger firms dominates the change in the relative price of owner-effort. The fourth column re-states the findings from Table 2 in the overall model. The probit coefficients are marginal effects at the mean for current and future tax rates. All columns include the standard controls for marital status, the number of dependents and personal property taxes. All dollars are inflation-adjusted, chained 2005 dollars.

	(1) *Observations Receipts < $250k*	*(2)* *Observations $250k ≤ Receipts < $3.5m*	*(3)* *Observations Receipts ≥ $3.5m*	*(4)* All Observations
First-Stage Probit:				
Current Marginal Tax Rate	0.33***	1.25***	1.01***	1.18***
(Std Error)	(0.06)	(0.01)	(0.31)	(0.04)
Future Marginal Tax Rate	-1.29***	-1.57***	-6.66**	-0.70***
(Std Error)	(0.06)	(0.00)	(2.97)	(0.04)
Non-Schedule C Business Income	0.180	-0.17***	-0.04	0.36***
(Std. Error)	(0.22)	(0.03)	(0.05)	(0.02)
Other Businesses: Indicator	9.63***	-15.66***	-7.37**	7.86***
(Std. Error)	(0.70)	(0.88)	(2.78)	(0.47)
Other Business: Farm Indicator	10.51***	6.89***	12.13**	12.57***
(Std. Error)	(1.28)	(1.60)	(4.42)	(0.86)
	(1) *Observations Receipts < $250k*	*(2)* *Observations $250k ≤ Receipts < $3.5m*	*(3)* *Observations Receipts ≥ $3.5m*	*(4)* *All Observations*
Second-Stage Regression:				
Current Marginal Tax Rate	827.09***	-751.74***	-10,104.70**	-7,678.47***
(Std Error)	(233.74)	(210.05)	(5117.24)	(538.44)
Future Marginal Tax Rate	-2652.91***	1470.13***	7398.44***	8,707.42***
(Std Error)	(315.91)	(211.19)	(4818.91)	(491.92)
Capital Income	0.01***	-0.003	0.617***	0.22***
(Std Error)	(0.00)	(0.003)	(0.03)	(0.01)
Depreciation	2.19***	0.36***	0.370***	0.34***
(Std Error)	(0.04)	(0.01)	(0.06)	(0.03)
S-Corp Business Income	-0.01***	-0.001	0.078***	0.03***
(Std Error)	(0.00)	(0.00)	(0.01)	(0.00)
Correlation Coefficient (ρ)	0.937	0.086	-0.882	-0.953
Pseudo-R^2	0.019	0.033	0.028	0.044
Observations	286,437	102,949	13,168	402,554

Note: (***) denotes significance at 0.01%, (**) denotes significance at 5% and (*) at 10%.

Table 1.3b
Robustness Check: Cutting the Data by Firm Size, as Measured by Gross Business Receipts

The elasticity estimates using the coefficients reported in Table 5a are reported for "small", "medium" and "large" firms, by gross business receipts, for all observations in the 1992-2005 dataset. Larger firms are much more likely to employ labor than small firms and have wage bills that are more sensitive to changes in current tax rates. Medium and large firms respond identically in magnitudes to increases in future taxes. Median elasticities are not reported in Column 1 because the median wage bill for small firms in the dataset is $0, which yeilds an elasticity estimate of 7.75 for both current and future tax rates.

	(1) *Observations* *Receipts < $3.5m*	*(2)* *Observations* *$250k ≤ Receipts* *Receipts ≥ $3.5m*	*(3)* *Observations* *Receipts ≥ $3.5m*	*(4)* *All Observations*
Probability of Employing Labor:				
Mean:	9.99%	66.29%	76.89%	25.00%
Wage Bill Current Tax-Rate Elasticity				
Mean Elasticity	1.03	-0.03	-0.08	-0.17
Median Elasticity	-	-0.10	-0.20	-0.64
Wage Bill Future Tax-Rate Elasticity				
Mean Elasticity	-5.41	0.06	0.06	0.18
Median Elasticity	-	0.17	0.14	0.65
Observations	286,437	102,949	13,168	402,554

Note: Elasticities are average point-estimates that use the mean or median salary expense for the respective observations.

Table 1.4
Elasticity Estimates for Specific Tax Reforms
(OBRA-93 and EGTRRA-JGTRRA 2001-2003)

Subsets of the overall dataset on Schedule-C business filers are exploited to isolate the short-run effects of the 1993 tax increases (OBRA-93) and 2001-2003 tax decreases (EGTRRA & JGTRRA) using the Heckman 2-step Model. Observations appearing in 1992-1994 surround the 1993 tax increases while observations in 2000-2005 surround the gradual tax decreases in 2001-2003. Mean and median wage bill elasticity estimates for the respective tax increases (1993) and decreases(2001-2003) are reported. The elasticity estimates for tax increases of 1993 are statistically different than the tax decreases in 2001-2003 for current tax rates but not for future tax rates. The third column re-states the estimates from Table 2 in the overall model.

	(1) 1992-1994	*(2)* 2001-2005	*(3)* All Observations
Probability of Employing Labor:			
Mean:	29.78%	24.68%	26.57%
Wage Bill Current Tax-Rate Elasticity			
Mean Elasticity	-0.47	-0.27	-0.17
Median Elasticity	-0.60	-0.31	-0.64
Wage Bill Future Tax-Rate Elasticity			
Mean Elasticity	0.117	0.103	0.18
Median Elasticity	0.096	0.127	0.65
Observations	99,091	143,054	402,554

Note: Elasticities are average point-estimates that use the mean or median salary expense for the respective observations.

Table 1.5
Omitted Variable Bias: The Implications of Omitting Future Tax Rates when Modeling the Employment and Wage Bill Responses of Small Businesses to Tax Rate Changes

Table 4 compares a Heckman model with both current and future tax rates to a Heckman model with only current tax rates in Columns 1 and 2, respectively. Including only current tax rates biases the marginal effect on employing labor upwards in the first stage, as shown in Column 2 where a 1 percentage point change in current tax rates implies firms are 5.02% more likely to employ outside labor. Excluding the future tax variable results in a positive coefficient in the second stage for the wage bill, instead of the negative coefficient found in Column 1. Marginal effects and coefficients for the other independent variables change little when future tax rates are excluded. Columns 3 reports the least squares regression using both future and current tax rates and Column 4 is identical to Column 3 but excludes future tax rates. Column 4 is most similar to the methodology employed by previous authors where the first stage is a probit model that is independent from the second stage least squares regression on only observations with positive wage bills. The bias occurs from estimating the entire behavioral effect as contemporaneous instead of decomposing the response to account for the anticipatory effect as well. Omitting future tax rates as an explanatory variable induces an omitted variable bias that skews the interpretation of only the coefficients and marginal effects of interest.

	(1)	*(2)*	*(3)*	*(4)*
Independent Variables	*Heckman Current & Future Tax Rates*	*Heckman Current Tax Rates*	*Least Squares Wage Bill >0 Current & Future Tax Rates*	*Least Squares Wage Bill >0 Current Tax Rates*
First-Stage (Probit)				
Current Tax Rate	1.18***	5.02***	1.18***	5.02***
(Std. Error)	*(0.04)*	*(0.00)*	*(0.04)*	*(0.00)*
Future Tax Rate	-0.70***	-	-0.70***	-
(Std. Error)	*(0.04)*		*(0.04)*	
Constant	-2.21***	-2.20***	-2.21***	-2.20***
(Std. Error)	*(0.08)*	*(0.08)*	*(0.08)*	
Observations	402,554	402,554	106,970	106,970
R^2 *(Pseudo-R^2)*	*0.044*	*0.043*	0.096	0.095
Second-Stage (Regression)				
Current Tax Rate	-7,678.47***	925.81***	29.17	3357.63***
(Std. Error)	*(538.44)*	*(199.6)*	*(50.18)*	*(193.84)*
Future Tax Rate	8,707.42***	-	3409.02***	-
(Std. Error)	*(491.92)*		*(460.93)*	
Capital Income	0.22***	0.22***	0.11	0.11
(Std. Error)	*(0.01)*	*(0.01)*	*(0.08)*	*(0.08)*
Depreciation	0.34***	0.35***	1.04***	1.05***
(Std. Error)	*(0.03)*	*(0.03)*	*(0.13)*	*(0.13)*
Non-Schedule C Business Income	0.03***	0.03***	0.01	0.01
(Std. Error)	*(0.00)*	*(0.01)*	*(0.01)*	*(0.01)*
Other Businesses: Indicator	-	-	38.74***	41,135***
(Std. Error)			*(5.13)*	*(5184.39)*
Other Business: Farm Indicator	-	-	-27.118***	-26,460***
(Std. Error)			*(9.86)*	*(9882)*
Constant	2,811,514***	2,796,106***	14,573	15,623
(Std. Error)	*(137,586)*	*(137,700)*	*(18,373)*	(18,414)
Correlation Coefficient (ρ)	-0.95	-0.95	0	0
Likelihood Ratio	20,289	19,988		
Observations	402,554	402,554	106,970	106,970

Note: All std. errors are robust or adjusted standard errors depending on which is appropriate. (***) indicated significance at 0.01%, (**) indicates significance at 5% and (*) denotes significance at 10%. The correlation coefficient is reported in Columns 1 and 2 for the Heckman. least squares assumes a correlation coefficient=0 when a probit model is estimated for the first stage - the probit estimates are identical to the first stage in the corresponding Heckman models.

Table 1.6
Specification Testing: Comparison of Heckman Estimates to Other Specifications

Column 1 re-states the second-stage estimates from the Heckman results reported in Table 2. Columns 2-4 present results from different specifications of the model. Current and Future tax rate coefficients are reported in dollars and all other dollar denomiated variables are reported in $100,000s. Columns 3 and 4 show the results from a standard OLS regression on all observations, even those not employing labor and an OLS regression on only observations employing labor, the latter is the specification used in past research. Truncated OLS does not account for any correlation between the employment and salary expense decisions. Standard OLS shows the mean effect of increasing tax rates on the entire population regardless of if an observation employs labor or not. Mean and median elasticities are reported for each specification. In Columns 1 and 2, we see that the additional restrictions added by the Tobit model lead to a reverse in signs for the elasticity estimates. Additional controls for the number of dependents, marital status and property taxes are used in all model specifications. The Wald Test is reported for the Heckman specification and is significant at 0.01%. The Tobit model is nested in the Heckman 2-Step; a Likelihood Ratio test fails to reject the null hypothesis that the Heckman is the true model at 0.01%.

	(1)	*(2)*	*(3)*	*(4)*
Independent Variables	*Heckman 2nd-Stage Estimates*	*Tobit Estimates*	*OLS All Observations Estimates*	*OLS on Positve Wage Bill >0 Estimates*
Current Tax Rate	**-7,678.47*** **	6,810.47***	575.86***	29.17
(Std. Error)	*(538.44)*	*(493.2)*	*(168.71)*	*(50.18)*
Future Tax Rate	**8,707.42*** **	-2,391.15***	649.14***	3,409.02***
(Std. Error)	*(491.92)*	*(399.64)*	*(161.00)*	*(460.93)*
Capital Income	0.22***	-1.08***	0.024	0.11
(Std. Error)	*(0.01)*	(2.26)	(0.02)	(0.08)
Depreciation	0.34***	1.34***	0.76***	1.04***
(Std. Error)	*(0.03)*	(0.05)	(0.09)	(0.13)
Non-Schedule C Business Income	0.03***	-0.02***	-0.003	0.01
(Std. Error)	*(0.00)*	(0.00)	(0.00)	(0.01)
Other Businesses: Indicator	-	70.113***	12.33***	38.74***
(Std. Error)	-	(4.35)	(2.05)	(5.13)
Other Business: Farm Indicator	-	79.321***	6.00**	-27.118***
(Std. Error)	-	(6.68)	(3.05)	(9.86)
Constant	2,811,514***	-1,841,021***	2,540	14,573
(Std. Error)	*(137,586)*	(89,067)	(4,577)	(18,373)
Correlation Coefficient (ρ)*	-0.95	1	-	0
Likelihood Ratio	20,289	-1,721,643		
R^2	0.044	0.006	0.066	0.096
Observations	402,554	402,554	402,554	106,970
Wage Bill Current Tax-Rate Elasticity				
Mean Elasticity	-0.170	0.148	0.013	0.001
Median Elasticity	-0.637	0.521	0.046	0.002
Wage Bill Future Tax-Rate Elasticity				
Mean Elasticity	0.178	-0.051	0.014	0.072
Median Elasticity	0.647	-0.192	0.051	0.265

Note: All std. errors are robust or adjusted standard errors depending on which is appropriate. (***) indicated significance at 0.01%, (**) indicates significance at 5% and (*) denotes significance at 10%. The correlation coefficient is reported in Column 1 for the Heckman, the Tobit assumes a correlation coefficient of 1 and truncated OLS used in previous studies assumes a correlation coefficient=0 when a probit model is estimated for the first stage - the probit estimates are identical to the first stage in the Heckman model, refer to Table 2 to review. Elasticities are average point-estimates that use the mean or median wage bill for the respective observations. The pseudo-log likehood is reported for the Tobit instead of the likelihood ratio in Column 2.

Figure 1.1 –The Effect of Tax Changes on Firm's Demand for Labor

Figure 1.1 displays the optimal owner-effort and labor choices for any given sole proprietorship. The value of the marginal product of owner effort is denoted by the downward sloping curve labeled *MP(e).* The two full upward sloping curves represent the after-tax marginal cost of owner effort under no taxes and then the critical tax rate (t_c). The upward sloping $MC(e)/(1-t_0)$ curve represents owners who only exert managing effort, have zero labor effort, and employ outside labor. The horizontal axis measures the total amount, or quantity, of owner-effort exerted through managing effort and labor effort. The shadow price of owner effort is listed on the vertical axis.

Case 1: Firms with zero wage bills may employ outside labor after a tax increase due to the relative price increase of owner-effort as a productive input. For any given firm, there exists a critical tax rate (t_c) such that $t > t_c$ implies $L > 0$. There is also a second critical tax rate (t_0) such that $t > t_0$ implies $e_L = 0$. As long as $e_L > 0$, the firm owner simply equates his marginal products of managing effort and labor effort $[MP(e_m) = MP(e_L)]$ during maximization. But if $L > 0$, the owner equates the marginal product of his labor effort with the competitive wage because his labor effort and outside labor are perfect substitutes $[MP(e_L) = w]$. It follows that there is a range of tax rates over which all shifts of the after-tax marginal cost curve can cause a one-for-one substitution of managing effort for labor effort (e_m for e_L). Once t_0 is exceeded, the owner does not exert any labor effort; he equates his marginal cost of managing with the marginal product of managing: $e_L = 0$ *and* $MC(e) = MC(e_m) = MP(e_m) > w$.

Case 2: Firms with positive wage bills prior to tax increases are denoted by the upward sloping $MC(e)/(1-t_0)$ curve. The firm owners only exert managing effort and upon tax increases, the marginal cost of managing effort increases and owners spend less time managing. Henceforth, all changes in employment and output are due to the scale effect of reduced effort which reduces production. After the tax increase, the business owner reduces his demand for outside labor, *ceteris paribus*.

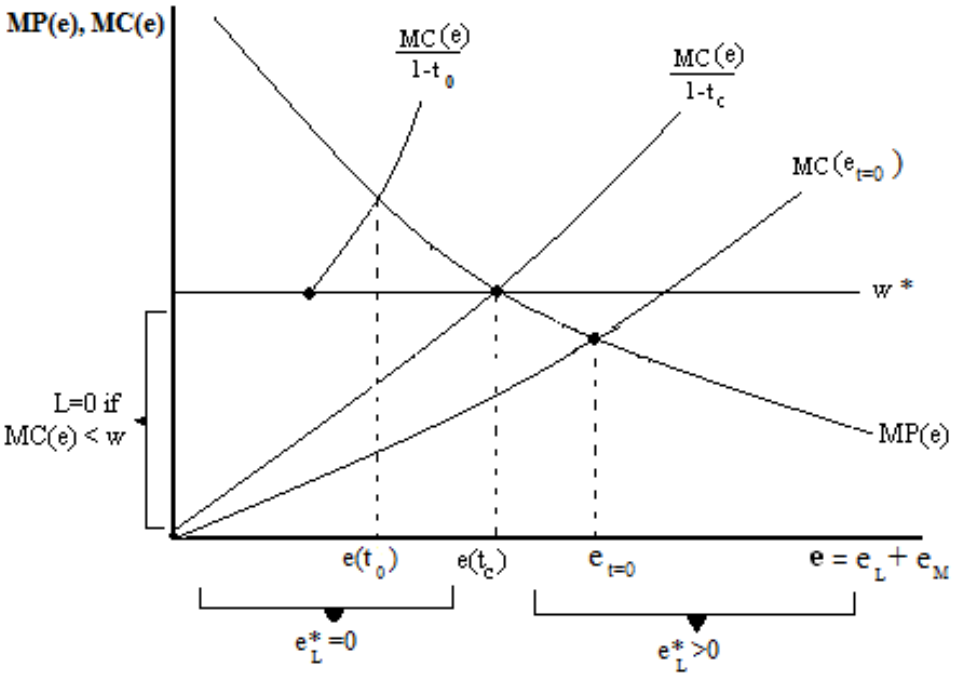


Figure 1.2 – Wage Bill Kernel Density Estimate

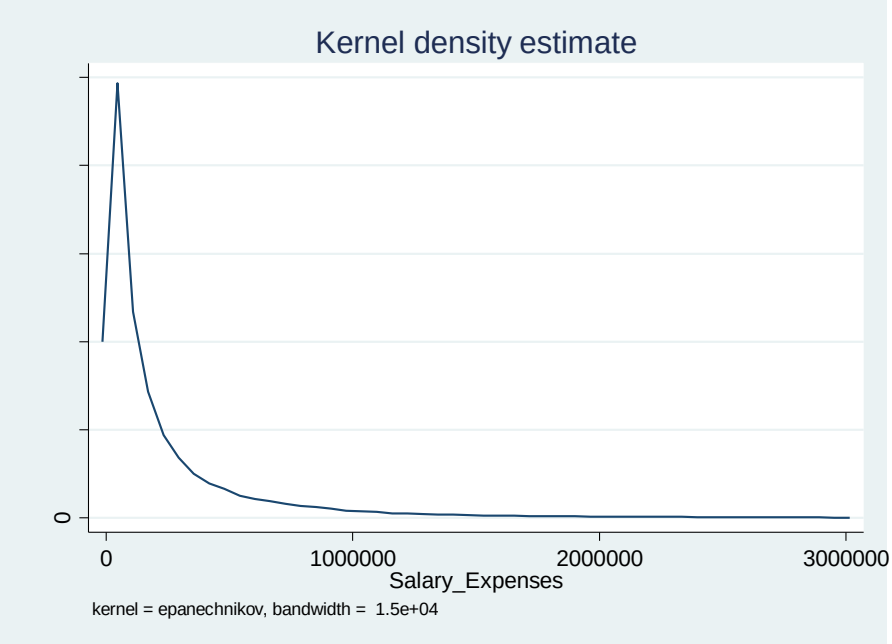


Figure 1.3 – Kernel Density Estimate for Wage Bill > $5million, 1992-1994

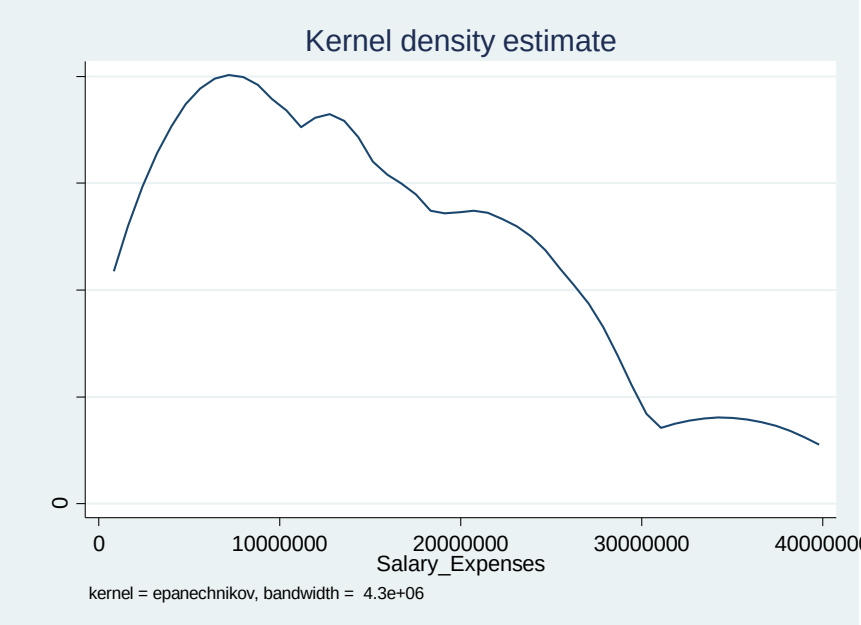


Figure 1.4 – Kernel Density Estimate for Wage Bill > $5million, 2001-2005

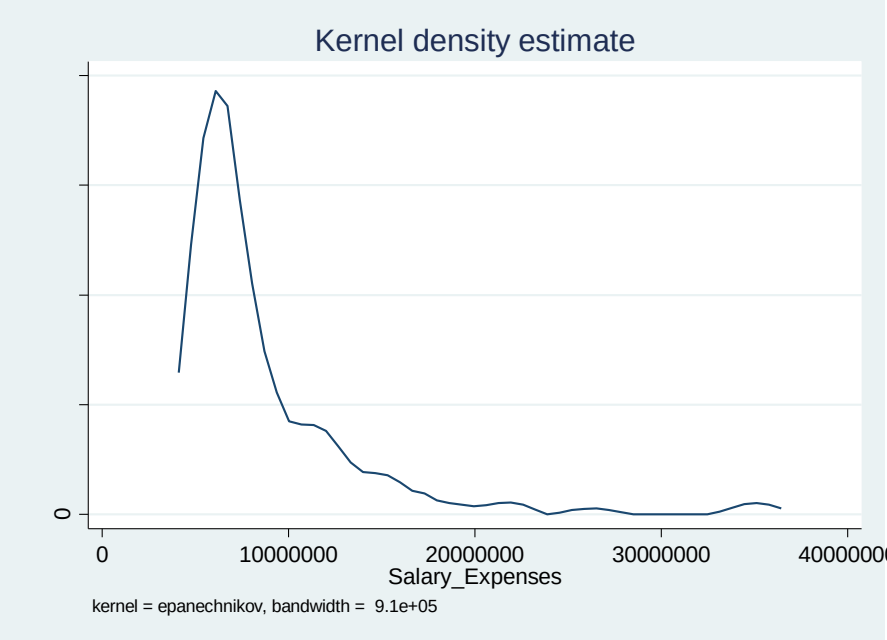


Figure 1.5 - Historical Tax Brackets and Tax Rates

Personal Income Tax Brackets 1988-2005 for Married filing Jointly

1988-1990*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$29,750
28.0%	$29,750	$71,900
33.0%	$71,900	$149,250
28.0%	$149,250	-

1991-1992*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$34,000
28.0%	$34,000	$82,150
31.0%	$82,150	-

1993-2000*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$36,900
28.0%	$36,900	$89,150
31.0%	$89,150	$140,000
36.0%	$140,000	$250,000
39.6%	$250,000	-

2001

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$45,200
27.5%	$45,200	$109,250
30.5%	$109,250	$166,500
35.5%	$166,500	$297,350
39.1%	$297,350	-

2002

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
10.0%	$0	$12,000
15.0%	$12,000	$46,700
27.0%	$46,700	$112,850
30.0%	$112,850	$171,950
35.0%	$171,950	$307,050
38.6%	$307,050	-

2003-2005*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
10.0%	$0	$14,000
15.0%	$14,000	$56,800
25.0%	$56,800	$114,650
28.0%	$114,650	$174,700
33.0%	$174,700	$311,950
35.0%	$311,950	-

*Income ranges are listed for the first year and are adjusted for inflation in consecutive years.

Figure 1.6 – Anticipated Tax Brackets and Tax Rates 2001-2010

Proposed Changes in Tax Rates 2001-2010 (under EGTRRA 2001) for Married Filing Jointly

Tax Rate prior to July 1, 2001			**Tax Rate July 1, 2001 -2003**			**Tax Rates 2004-2005**			**Tax Rates 2006-2010**		
Marginal	Income Brackets		Marginal	Income Brackets		Marginal	Income Brackets		Marginal	Income Brackets	
Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*
0.0%	$0	$26,350	10.0%	$0	$12,000	10.0%	$0	$14,300	10.0%	$0	$14,000
15.0%	$26,350	$63,550	15.0%	$12,000	$46,700	15.0%	$14,300	$58,100	15.0%	$14,000	$56,800
28.0%	$63,550	$132,600	27.0%	$46,700	$112,850	26.0%	$58,100	$117,250	25.0%	$56,800	$114,650
31.0%	$132,600	$208,350	30.0%	$112,850	$171,950	29.0%	$117,250	$178,650	28.0%	$114,650	$174,700
36.0%	$208,350	$288,351	35.0%	$171,950	$307,050	34.0%	$178,650	$319,100	33.0%	$174,700	$311,950
39.6%	$288,351	-	38.6%	$307,050	-	37.6%	$319,100	-	35.0%	$311,950	-

*Income ranges are listed for the first year only.

CHAPTER TWO

THE ELASTICITY OF TAXABLE BUSINESS INCOME AND THE WELFARE COST OF PERSONAL INCOME TAXES ON THE EMPLOYMENT DECISIONS OF SMALL BUSINESSES

1 Introduction

The existing small business literature pertaining to income tax changes estimates the employment and wage-bill elasticity responses of businesses to tax changes. It does not estimate or focus on the respective welfare costs of income taxes. The full welfare cost of any tax includes many factors; some of which are difficult to quantify. A change in the amount of owner-effort exerted affects the firm's demand for other productive inputs like labor and capital. My analysis focuses on the marginal welfare cost of reduced owner-effort and the owner's corresponding decrease in demand for outside labor, relative to the previous income-tax regime.

I follow Feldstein's (1999) approach that proves the elasticity of taxable income is a sufficient statistic for measuring the marginal welfare cost of an income tax change. I estimate the marginal welfare cost of reduced owner-effort and the corresponding reduction in reported taxable business income using the elasticity of taxable business income for small business employers. The elasticity of taxable business income is a sufficient statistic in estimating the marginal welfare cost of changes in taxable business income with respect to tax changes.[59] The elasticity of taxable business income measures

[59] As a sufficient statistic, the elasticity of taxable business income accounts for the owner's opportunity cost (leisure) and changes in owner-effort exerted in the business of interest. The elasticity of taxable business income also encompasses changes in reported business expenses, revenues and deductions.

the long-run annual incremental cost of a permanent income-tax increase relative to the previous income tax regime.

Small business employers also demand less outside labor when the owner exerts less effort in the firm. When the demand for outside labor declines, displaced small business employees enter a state of unemployment. All displaced labor in unemployment must be absorbed by the rest of the economy before the new long-run equilibrium is reached. I also estimate this short-run one-time cost of displaced labor because it is not included in the estimate for the elasticity of taxable business income.

First, I estimate the long-run annual welfare cost of the 1993 and 2001-2003 personal income tax reforms using the elasticity of taxable business income in a difference-in-difference analysis similar to the one performed by Feldstein (1995). I use the cross-sectional NBER Public Use file on Schedule C filers (sole-proprietors) for the years surrounding each tax reform.[60] This elasticity of taxable business income implies that the marginal welfare cost of the 1993 reform is $920 million and the cost of the 2001-2003 reforms is $245 million. I am able to provide a lower-bound for these costs using the median current-tax rate wage-bill elasticity estimate from the existing literature. The current-tax rate wage-bill elasticity can serve as a proxy for the elasticity of owner-effort. This is the best estimate available for the elasticity of owner-effort which is just one component of Feldstein's (1995) overall estimate for the elasticity of taxable

[60] The NBER dataset is identical to the dataset used in Player 2011.

income.[61] The wage-bill elasticity proxy implies a lower-bound of $168 million for the 1993 reform and $21.4 million for the 2001-2003 reforms.

To estimate the welfare cost of displaced small business labor, I utilize current-tax rate wage-bill elasticity estimates for the respective tax reforms from Player (2011).[62] This cost is not zero because of unemployment search costs, labor market frictions, and because the labor-supply curve is not perfectly inelastic.[63] Because this cost applies to all displaced workers, it could be quite large depending on the number of workers unemployed. I estimate the instantaneous cost of displaced labor to be $10 million for the 1993 reforms and $3.2 million for the 2001-2003 tax reforms. The lower-bound for both of these estimates is zero which would be the relevant welfare cost when displaced labor is costlessly absorbed by the rest of the economy.

2 Income Tax Background

In 1992, Presidential Candidate Bill Clinton campaigned on a promise to raise taxes on the wealthiest Americans. In the aftermath of Clinton's election, the Omnibus Budget Reconciliation Act of 1993 (OBRA-93) was signed into law. OBRA-93 increased personal income taxes on Americans reporting adjusted gross incomes in excess of

[61] The elasticity of effort is very difficult to quantify but the current-tax rate wage-bill elasticity from Player (2011) provides a robust estimate for the scale effect that Schedule C employers undertake in response to tax rate changes. The estimate provides a valid proxy so long as owner-effort and outside labor change proportionally with respect to income-tax changes.

[62] Theoretically, the total cost of transition includes two parts: the instantaneous cost of displaced labor plus the costs required for labor to be gradually absorbed by other sectors to eventually reach a new long-run equilibrium. I focus on the instantaneous cost because my data provide reliable estimates for the cost and because estimating the absorption path depends on many of the parameters estimated in the labor and unemployment duration literature. However, the estimates for the needed parameters vary across studies and depend on many factors beyond the scope of this analysis.

[63] If the supply of labor is perfectly inelastic, the welfare cost of the tax increase is zero because labor instantly accepts a lower wage and is not displaced.

$140,000.[64] Married taxpayers filing jointly with AGI greater than $250,000 faced statutory tax rates of 39.6% instead of 31%. Those with AGI greater than $140,000 but less than $250,000 faced a statutory tax rate of 36% instead of the previous 31%. The 1993 tax reforms only affected the top-income filers and could have been expected with confidence months in advance.[65]

Whereas OBRA-93 increased tax rates, the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) lowered personal income-tax rates for most taxpayers. Tax-rate decreases were expected to phase-in gradually through 2006. Rates initially decreased to 39.1% from 39.6% for the top tax-bracket and were scheduled to decline gradually to 35% over five years.[66] In general, each bracket rate decreased by half of a percentage-point in each year. In an attempt to stave off recession, Congress and President Bush passed the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) in May 2003. JGTRRA sped up the tax decreases previously scheduled for 2006 to retroactively take effect in the 2003 tax year.[67]

[64] OBRA-93 also repealed the cap on Medicare taxes, increased the taxable portion of social security benefits, limited itemized deductions, increased Federal fuel taxes and expanded the Earned Income-tax Credit (EITC).

[65] The 1993 tax hikes were most likely anticipated in 1992 because the Clinton campaign focused on increasing taxes on the top 1% of taxpayers (defined as AGI greater than $139,999). Furthermore, recent research comparing treasury bonds with tax-exempt treasury bonds proposes that markets anticipate tax changes often years in advance quite accurately. Poterba (1986) and Kochin and Parks (1998) provide two independent studies. For a complete discussion, reference the literature on expected future tax-rates and tax-exempt bonds.

[66] See Figures 1 and 2 for comparison of anticipated and actual tax rates.

[67] See Figure 1 for all relevant statutory tax rate changes.

3 Past Literature

An income tax affects the production mix and tax-preparation of small businesses in many ways. Business owners may reduce their own effort, and reduce their demand for, and input-mix of, other productive inputs. A business owner may stop production and shut-down operations entirely. Additionally, they may try to reduce their taxable business income using legal write-offs and deductions (tax-avoidance) or illegal misreporting (tax-evasion). Any deviation from the optimal production amount and mix due to taxation is a welfare cost borne by society.

Researchers must identify the relevant counterfactual state-of-the-world to accurately analyze the welfare changes given a tax increase. Harberger (1964) frames the most prominent welfare cost approach; he measures the deadweight loss associated with an economy in any given nonoptimal position rather than assuming the economy is in a Pareto-optimal position before the distortion.

Feldstein (1999) proves that the elasticity of taxable income is a sufficient statistic to measure the excess burden of income taxation. He shows that researchers can identify the single elasticity estimate rather than focusing on all of the channels through which taxes affect behavior (e.g. hours, effort, training, evasion and avoidance). Feldstein (1995) employs a difference-in-difference analysis on a panel of Form 1040 tax filers to estimate the elasticity of taxable income. He concludes that the welfare cost of an income tax is possibly as high as $3 per $1 of tax revenue raised for high-income individuals.[68]

[68] High-income is defined as tax-filing households with adjusted gross income in excess of $250,000.

Although the elasticity of taxable income is a sufficient statistic for welfare cost analysis, Chetty (2008) argues it overestimates the excess burden of taxation. He shows that some of the tax-avoidance behavior may be quantifiable shifts to other taxable areas of the economy. Additionally, he argues that individuals may overestimate the true costs of tax-evasion and tax-avoidance. Rather than focusing only on the elasticity of taxable income, Chetty's welfare cost analysis is a weighted-average of the taxable income elasticity and the total earned-income elasticity with respect to changing tax rates. Income-shifting to other taxable bases probably occurs less for businesses because business income has fewer margins for adjustment than adjusted gross income and is a subset of adjusted gross income.

My analysis focuses on taxable business income which is one element of total taxable income, and hence one component of the elasticity of taxable income. Many authors have shown the elasticity of taxable income to be larger for individuals with relatively high incomes and with positive business income.[69] Business income and asset allocation are also significantly affected by personal income taxes. Feldstein (1976) shows that marginal tax rates have a substantial effect on the shares of portfolios invested in different types of assets. Although high-income individuals are often business owners, the contribution of business income to the overall income elasticity estimate has not yet been studied. This in an interesting area considering politicians typically care about small business employment and small business contributions to economic growth.

[69] The empirical literature on individual taxpayers has found the excess burden of taxation to be large for income-earners in the top-percentile but relatively low for the rest of the income distribution. For a few examples, refer to Lindsey 1987, Slemrod 1998, Gruber and Saez 2002, Saez 2004.

Additionally, business income is known to constitute a large portion of adjusted gross income. Feldstein calculates that 25% of adjusted gross income for individuals over $200,000 is from unincorporated business cash flows and the percentage increases with higher levels of income. I isolate the elasticity of taxable business income to show that business income may be a large and elastic component of the overall measure for the elasticity of taxable income.[70] It seems that a substantial proportion of the behavioral response to a tax change occurs at the business income margin rather than other margins like wages, exemptions and personal deductions.[71]

The existing empirical literature on small business tax-behavior estimates the wage-bill elasticity with respect to current and future tax changes. The existing literature does not provide marginal welfare cost estimates or policy implications (Carroll et. al 2000a LaLumia 2008, Player 2011). This paper offers such an estimate.

My welfare analysis includes an estimate for the cost of labor displaced from the small business sector. The existing literature on unemployment duration and unemployment benefits is vast and robust. I will simply review the theoretical foundations and highlight several papers that are applicable to my study in the areas of unemployment duration and unemployment insurance. Unemployment insurance makes unemployed workers less likely to accept any given position and is a contributing factor to unemployment duration. Because of unemployment insurance, workers who are

[70] Giertz (2009) makes one of the few attempts to forecast tax revenues using the elasticity of taxable income. He forecasts the impact of the Bush Tax Cut expiration in January 2011. Using various measures of the elasticity of taxable income he predicts revenue collections will be between 12-62% less than the mechanical revenue calculation when behavior does not change. The major driver of this result is the fact that the Bush Tax Cuts affect every tax bracket and not just the upper income brackets.

[71] This suggests either the supply of owner-effort is very elastic or that the level of reported business income is relatively easy to manipulate, or a combination of both.

laid-off experience a net loss in income that is less than the full decline in wages. Henceforth, workers will be less likely to accept a new position when they are still eligible to receive unemployment benefits. Welch (1977) and Ham et al. (1987) find a positive relationship between unemployment compensation and unemployment duration. Nickell (1979) estimates the probability of any given worker leaving unemployment for a given state, conditional on being unemployed. He finds this probability increases when unemployment benefits expire or are about to expire. In addition to unemployment insurance, mobility costs and job-search costs also contribute to unemployment duration. Diamond (1981) focuses on mobility costs while Salant (1997) focuses on the costs of searching and matching.

4 Data

Data come from the NBER Public Use File on Individual Income-tax Returns from 1992 and 1994 and 2000 and 2004. Each year of data provides a 10% stratified random sample of unaudited and unamended tax returns. High-income households are oversampled and there are no missing values in the dataset[72]. All upper-income returns that are sampled at greater than 10% are sub-sampled at 10% to further protect taxpayer identity.[73] Cross-sectional data capture population changes over time and avoid the

[72] For each year, all of the extreme value AGI filers are not included in the sample because there would be a 10% chance of selection for each filer.

[73] For all filers with AGI greater than $200,000 several codes are completely removed: State Codes, Alimony Paid/Received, and State Sales Tax Deduction. This applies to roughly 25% of firms employing labor and 6% of firms without labor. Marital Status and number of dependents are also modified. For high AGI filers, returns are further modified: the Schedule C fields for salaries and wages, state income-taxes, and real estate taxes are blurred by multivariate blurred when two of the three categories have nonzero numbers. Multivariate blurring is applied to each of the three categories after sub-grouping, the observation

survival bias and mean-reversion associated with a balanced panel.[74] As shown in Figures 2.3 and 2.4, the distribution of Schedule C employers is changing over time with many entities dropping out of the Schedule C filing status. This can be due to reclassifying as another flow-through entity or discontinuing the firm's operations. Theoretically, taxpayers in the cross-sectional model represent different taxpayers over the years but they are assumed to behave identically, which is consistent with past empirical tax research.

My analysis will focus on Schedule C data and taxpayer characteristics.[75] The data reported on a Schedule C include the aggregate revenues, expenses and net income from the business endeavors of sole-proprietors.[76] Schedule C filers can, and legally should, include "odd-job" income from individuals without formal business names or practices. In 2007, 23.1 million returns included a Schedule C filing.[77] Schedule C entities represent about 70% of all IRS documented businesses over 1988-2007.[78]

Taxpayers receiving social-security income are dropped from the dataset because potential retirees may alter reported business income differently when faced with tax

---

is averaged with the two observations closest to it and then the field is replaced with the average value. It is important to remember than one observation never contains the full content of the return and often includes data from more than one return.

[74] Feldstein (1995) uses a balanced panel of taxpayers appearing in both 1985 and 1988. Tracking individuals over time has benefits but I will show that the distribution of Schedule C filers, particularly employers, is changing dramatically over my time-horizon.

[75] Schedule C data have limited personal characteristic variables; however, the data are rich in income and expense variables.

[76] Schedule C does not include data for S-Corporations and some LLCs. Single member Limited Liability Corporations (LLCs) can elect to file a Schedule C. In 2005, of the Schedule C filers, roughly 450,000 were registered LLCs. Multi-member LLCs are type of partnership and file a Schedule E under Partnership Income.

[77] If a taxpayer owns several businesses, a Schedule C is filed separately for each business.

[78] C-corporations are included in the aggregate IRS business filings. The number of C-corporations drops from about 12% in 1988 to 5.8% of all filers in 2007. The number of S-corporations rises from 6.6% to 12.5% for 1988 and 2007, respectively.

changes than non-retirees.[79] Observations with positive AMT[80] liabilities are excluded because they face different marginal and statutory tax rates than peer filers.[81] I include loss-entities in my sample because the losses are probably not random and contain information valuable to the analysis. This is particularly true if reporting a loss-entity becomes more attractive because of higher statutory tax rates.[82]

4a Data: *Summary Statistics 1992 and 1994*

Unweighted selected summary statistics for the Schedule C employers[83] are presented in Table 2.1a for 1992 and 1994 and Table 2.1b for 2000 and 2004. Referring to Table 2.1a, the average statutory tax rate for employers in 1992 is 20.6% and in 1994 is 23.03%.[85] Whereas the average statutory tax rate rose due to the 1993 tax reforms, taxable business income fell. Small business employers report average taxable business income of $183,362 in 1992 and $178,917 in 1994.

Not surprisingly, Schedule C employers report much higher overall adjusted gross incomes than the average population. The mean and median AGI for the 1992 sample are $233,561 and $103,332, respectively. The mean and median AGI for the 1994 sample are $215,134 and $102,799, respectively. On average, it appears that changes in taxable business income account for roughly one-quarter of the changes in AGI reported over this

[79] Approximately 4,000 observations are omitted in each year. This is consistent with the literature; leisure may be less costly to retirees than non-retirees, in which case they will respond more acutely to small tax rate changes.
[80] AMT stands for "Alternative Minimum Tax": approximately 2000 observations in each year, or 6% of the sample used, are deleted because of the AMT.
[81] Taxpayers with AMT liabilities pay a flat-tax and do not pay the statutory rates listed in the IRS tax tables.
[82] Omitting loss-entities may be more convenient when estimating elasticities because the data can be easily transformed into natural logarithms; however, I prefer to keep the information contained in that data and use levels.
[83] I define an employer as a Schedule C filer with a positive wage bill.
[85] All dollar figures are adjusted for inflation and stated in 2005 real dollars.

period.[86] Adjustments in taxable business income may be one important way Schedule C employers are able to reduce their reported AGI and income-tax liability.

Mean gross receipts for Schedule C employers also decline between the two years. In 1992 mean gross receipts are $1,451,427 and in 1994 they are $1,255,608. The average wage bill for employers declined over the time period as well. It is $242,074 in 1992 and $200,589 in 1994. Conversely, self-employment income for employers rose to $42,952 in 1994 from $39,987 in 1992.

In the 1992 sample, approximately 75.84% of owners report at least some of the business proceeds as self-employment income. This percentage rises to 78.26% in 2004. Schedule C filers employing labor account for roughly 29.88% of all Schedule Cs filed with the IRS in 1992 and 1994.

4b Data: *Summary Statistics 2000 and 2004*

Referencing Table 2.1b, the average statutory tax rate for employers is 25% in 2000 and is 19.94% in 2004. Employers report average taxable business income of $202,045 in 2000 and $190,027 in 2004. Although average taxable business income declined over the period, average AGI rose. The mean and median AGI for the 2000 sample are $633,431 and $150,216, respectively. The mean and median AGI for the 2004 sample are $782,642 and $115,622, respectively. Mean gross receipts for Schedule C employers in 2000 are $1,921,972 and in 2004 are $2,087,495.

[86] The total change in taxable business income is $4,445 ($183,362 in 1992, less $178,917 in 1994) and the total change in AGI is $18,427 ($233,561 in 1992, less $215,134 in 1994).

The average wage bill for employers rose over the time period. It is $293,102 in 2000 and $338,154 in 2004. Conversely, self-employment income for employers declined to $43,939 in 2004 from $48,482 in 2000. In the 2000 sample, approximately 76% of owners report at least some of the business proceeds as self-employment income. This percentage dips to 70.39% in 2004. Schedule C filers employing labor account for roughly 25% of all Schedule Cs filed with the IRS in 2000 and 2004.

4c Data: *Literature Estimates*

Player (2011) uses the same NBER Public Use File for 1992-1994 and 2000-2004 to estimate a Heckman selection model for the small business wage-bill elasticity with respect to changes in statutory tax rates. I utilize the Player (2011) current-tax rate wage-bill elasticity estimates as a lower-bound in my elasticity of taxable business income analysis. I rely on the Player (2011) wage-bill elasticity estimates again to estimate the short-run cost of taxation before labor is absorbed by other sectors of the economy.

For the 1993 and 2001-2003 reforms, Player (2011) estimates the median current-tax rate wage-bill elasticity to be -0.47 and -0.27, respectively. The difference between the two reforms could be due to the different natures of the reforms or a selection bias over time. Chetty (2011) argues there are optimization frictions to changing one's behavior in response to tax reforms. For small rate changes, like those in 2001-2003, behavioral changes are relatively costly, *ceteris paribus*, compared to behavioral changes in response to the sharp tax increases in 1993. Additionally, the fixed costs of changing one's behavior in response to tax changes could be sufficiently large that the small changes in the 2001-2003 reforms did not warrant substantial action. This is particularly

true when individuals or businesses must make adjustments in discrete integers. One example would be the decision to reduce employment; firms may be more likely to reduce employment by one worker rather than by one-minute of work, or even one hour.[88]

Another explanation for the differences between the two reform estimates could be a selection bias away from the Schedule C status for businesses. The popularity of the S-corporation rose over the time period because successful firms found the limited-liability structure appealing. The percentage of flow-through entities filing as S-corporations rose steadily between 1986 through 2004. The rules governing S-corporations changed under the 1986 tax reforms.[89]

5 Welfare Costs Measures: Elasticity of Taxable Business Income

To estimate the long-run annual marginal welfare cost of a tax increase, I rely on the elasticity of taxable business income. Feldstein (1995) proves the elasticity of taxable income is a sufficient statistic to measure the deadweight-loss of taxation. Assume utility is increasing in consumption and decreasing in effort; represented by: $U(c,e)$. Business owners produce output X using three inputs: capital, outside labor, and owner-effort; or more simply $X = f(K, L, e)$. Capital and labor expenses are tax-deductable business expenses but owner effort is not. The owner will be taxed at the same tax rate regardless of whether he pays himself a salary or extracts firm profits.

[88] The median wage bill for employers in 1992 is approximately $242,074 which equates to 5-6 employees when one assumes all employees are full-time workers earning the U.S. 1992 median income of $40,500.
[89] The 1986 reforms reduced the filing restrictions on S-corporations, making it easier to incorporate as one. See http://www.irs.gov/taxstats/bustaxstats/article/0,,id=152029,00.html for a full description of S-corporations and the percentage of flow-through entities filing as S-corporations over time.

Taxable business income is represented by M where $M = X - rK - wL$. Consumption is simply any business income left after taxes are deducted: $C = (1-t)M$. This implies a direct connection between tax changes and changes in owner-effort and therefore income from production. The cost of effort is increasing with output, income and hence, consumption. I assume that owners are indifferent between exerting effort in their firm and working (exerting effort) for someone else, *ceteris paribus*, because either source of income would be taxed at the same tax rate.

The major distortion when effort or income is taxed through an income tax is the owner's shift to the untaxed leisure market.[90] Any tax on effort is equivalent to a leisure subsidy. A tax increase on business income induces owners to consume more leisure. Additionally, higher tax rates may encourage owners to consume more of their salaries and profits through tax-deductable expenses like travel, meals and entertainment.[91] Increases in tax rates may also encourage owners to shift the timing of their compensation to periods with lower expected tax rates, even if such periods are years in the future.[92] Higher tax rates may induce additional misreporting and tax-evasion.

The elasticity of taxable business income is the single best measure for welfare cost analyses associated with business tax changes. Because of the envelop conditions of consumer and firm optimization, the elasticity of taxable business income accounts for all

[90] Retirees are excluded from the sample used for estimation because their preferences and cost of leisure are probably very different from prime age workers.
[91] Additionally, owners can partake in fringe benefits they provide for employees: on-site meals, daycare, and expensive health and dental insurance plans.
[92] Some fringe benefits like stock purchasing plans, retirement plans, and deferred compensation, allow owners and employees to "time" their compensation.

secondary distortions: elasticity of owner effort, elasticity of deductions, and elasticity of compensation.

Implementing the standard Harberger welfare cost analysis, the welfare cost of an income tax is:

$$Welfare\ Cost = \frac{1}{2}t^2\varepsilon_{TBI}(Taxable\ Business\ Income)\ ,$$

or for a change in income tax rates, the marginal excess burden of taxation can be written:

$$\Delta WC = \frac{1}{2}\cdot\frac{\Delta t^2}{t_0}\cdot\varepsilon_{TBI}\cdot(Taxable\ Business\ Income) \qquad (1)$$

Where ε_{TBI} represents the elasticity of taxable business income, Δt^2 represents the squared income-tax rate change, and t_0 represents the original tax rate.[93] When owners cannot alter their level of deductions or the timing of compensation, the elasticity of taxable business income would provide a robust proxy for the elasticity of owner-effort. The robustness of the proxy declines as the deductions and timing of compensation become increasingly flexible.

In a one-sector economy the elasticity of taxable business income is the only computation necessary to properly estimate the excess burden of a tax change. However, in a multiple-sector economy, such as one with differential tax rates on corporate and non-corporate income, further analysis may be required.

[93] Equation 1 is a linear approximation; therefore, discrete and marginal changes are identical because the discrete change is equal to the marginal effect multiplied by the change. Also, I am assuming that there is no change in the price per unit used to generate income.

6 Welfare Cost Estimation: The Elasticity of Taxable Business Income

The elasticity of taxable business income simply measures the change in reported taxable business income associated with a tax change. This is one component of the overall measure for the elasticity of taxable income that Feldstein (1995) estimates. The elasticity of taxable business income may be upwardly biased and overstate the actual welfare loss if business owners can shift assets to other taxable areas in the economy.[94] The true marginal welfare cost is the loss associated with the increase in leisure hours and assets shifted to less productive untaxed sectors.

The flexibility of taxable business income depends on many things including the flexibility of owner effort, deductions or expenses, the timing of compensation, and capital investments. Additionally, the cost of altering one's behavior in response to tax changes is most likely positive. Unfortunately, owner-effort is not directly observed and many of the other flexible factors also depend on tax rates.

6a Welfare Cost Estimation: Difference-in-Difference Analysis

I use the 1992 and 1994, and 2000 and 2004 datasets to directly estimate the elasticity of taxable business income for employers. I estimate the respective changes in levels for each cross-section and then use the average tax rate change to convert my estimates to elasticity form.[95]

[94] Business owners are probably less likely to shift business income to other taxable bases in the economy than nonbusiness owners because business owners are a subset of the overall population and have fewer margins to adjust. For a detailed discussion, see Chetty (2011). Business owners could theoretically restructure as a C-corporation and stop filing on the individual tax return entirely but this is unlikely past 1986 because individual tax rates are lower than corporate-tax rates.

[95] My data are rich in income characteristics; unfortunately, all of the variables one would like to include on the right-hand side of a regression are either jointly determined with taxable business income or are

The 1993 tax reform increased tax rates on individuals with adjusted gross income in excess of $140,000. I estimate the elasticity of taxable business income for all small business employers and then subtract the estimates for the group of employers who did not face any tax changes ($\Delta t=0$). This differenced estimate accounts for macroeconomic trends over the period. A similar methodology is employed for the 2001-2003 reforms.

Table 2.2 presents mean and median estimates for the elasticity of taxable business income for employers in the two years surrounding the 1993 tax reforms. Columns 1-3 summarize the percentage changes in tax rates and taxable business income for each level of adjusted gross income (AGI). Top income-earners, employers with AGI of $250,000 or more, are denoted "High" in Column 1. Schedule C employers with AGI greater than or equal to $140,000 but less than $250,000 in are denoted "Mid" in Column 2, and those with AGI less than $140,000 are labeled "Low" in Column 3. "Low" small business employers did not face any tax changes during the 1993 reforms and provide a benchmark for economy-wide trends which will be differenced out in Columns 4 and 5. Differencing yields unbiased estimates so long as each group of employers is affected equally by the macroeconomic trends.[96] This is particularly important between 1992 and 1994 because the "dot-com" boom begins in 1993 and extends through the end of the sample period. I want to account for the massive upward trend in production that is independent from the tax increases.

---

endogenous. Examples include: depreciation, capital expenses, capital income, the existence of other business income, and self-employment income.

[96] This differencing would not eliminate a bias from business owners shifting income to other taxable bases because only owners facing tax changes would shift any income. Chetty (2008) argues the elasticity of taxable income overestimates the excess burden of taxation. He shows that some of the tax-avoidance behavior may be shifts to other taxable areas of the economy.

Column 4 shows that the elasticity of taxable business income is -3.29 for "High" AGI employers and Column 5 shows the estimate is -5.39 for "Mid" AGI employers. These estimates reveal that business income is very sensitive to increases in tax rates.[97] For comparison, Feldstein's (1995) estimate for the overall elasticity of taxable income ranges from -0.45 to -1.45 after I convert his net-of-tax elasticity estimates (ranging from 1.1 to 3.05) to tax-elasticities for comparison.[98] The elasticity of taxable business income for employers is two to six times larger than the elasticity of taxable income for middle and high-income taxpayers.

The elasticity of taxable business income estimates for small business employers during the 2001-2003 reforms are presented in Table 2.3. The 2001-2003 reforms affected most tax-payers, with the exception of those in the lowest tax-bracket (10% in 2001 and 15% in 2003). The columns are similar to those presented for the 1993 reforms with additional columns for low-AGI employers facing tax changes and low-AGI employers not facing tax changes. Small business employers not facing tax rate changes are still utilized as a benchmark for economy-wide trends over the period.

Columns 5-7 of Table 2.3 show the differenced estimates for "High", "Mid" and "Low" AGI employers. In Column 5, employers with AGI greater than or equal to $250,000 have an average elasticity of taxable business income of -4.84. In Column 6, middle-income employers have a mean estimate of -3.53 and Column 7 shows the estimate for "Low" AGI employers to be -1.98.

[97] Feldstein shows tax rates have substantial impacts on the asset portfolio choices of high-income individuals (See Feldstein (1976) and (1997) for an in-depth analysis).
[98] Feldstein's (1995) original elasticity estimates are based off of the net-of-tax rate: T = (1-t), instead of simply the tax rate.

The estimates in Table 2.2 and Table 2.3 for the elasticity of taxable business income show that regardless of tax increases or decreases, taxable business income appears to be very responsive, particularly for high-income taxpayers. The estimates range between -3.29 and -5.39 for employers with AGI greater than $140,000 and the estimates are even more compact for the 2001-2003 reforms.

6b Welfare Cost Estimation using the Elasticity of Taxable Business Income

Now that I have estimates for the elasticity of taxable business income, I use the estimates to calculate the change in welfare according to Equation 1:

$$\Delta WC = \frac{1}{2} \cdot \frac{\Delta t^2}{t_0} \cdot \varepsilon_{TBI} \cdot (Taxable\ Business\ Income) \qquad (1)$$

I first calculate the welfare change for each individual in my dataset and I then aggregate the results for an overall sample estimate.

Table 2.4 shows the estimates for employers facing statutory tax changes in the respective base-year. Small businesses not employing labor and employers not facing tax rate changes are not included in any of the calculations. The marginal excess burden of taxation is reported per employer in Column 1. Column 2 displays the estimate for the base-year sample and Column 3 displays the estimate for the entire U.S. economy. The differenced elasticity estimates from Section 6a for low, mid, and high AGI employers are utilized to provide a range of estimates for the marginal welfare cost calculation.

For the 11,644 observations in 1992, the deadweight-loss per employer falls between $7,907 and $12,961 and the total deadweight-loss for employers is $920 million for the U.S. economy when the elasticity of taxable business income for high-AGI

employers is used (-3.29) and it is $1.5 billion when the elasticity of taxable business income for mid-AGI employers is used (-5.39).

The 2001-2003 reforms are not estimated to be as costly as the 1993 reforms, primarily because fewer businesses are electing to classify as a Schedule C entity. The per employer marginal welfare cost is estimated to fall between $4,065 and $5,567.[99] When I expand the 10% stratified random sample to the U.S. tax-filing population, the deadweight-loss for the U.S. economy is $335 million using the elasticity estimate for high-AGI employers (-4.84) and $244.5 million for the elasticity estimate for mid-AGI employers (-3.53).[100]

This is the marginal welfare cost directly associated with reduced owner-effort, and scaling back production due to the tax changes. The deadweight-loss from displaced labor is not included in this measure. The difference in the magnitudes of the deadweight-loss is attributed to the decline in the number of Schedule C employers between 1992 and 2000. If other flow-through entities respond to tax changes in the same manner and magnitude as sole-proprietors, the economic losses will be much higher.

7 Robustness Checks using Estimates from the Existing Literature

After directly estimating the elasticity of taxable business income for each tax reform, I compare my estimates with estimates from the existing literature. I first utilize

[99] I do not specifically mention the "Low AGI" elasticity estimate of -1.98 to maintain consistency with the 1993 reforms where only tax-payers with AGI in excess of $140,000 experienced any tax rate changes. The per employer marginal welfare cost associated with the -1.98 elasticity is $2,273.

[100] As a reference point for the relative magnitudes of the welfare costs (gains), GDP in 1994, 2000, and 2005 was $8.9 trillion, $11.2 trillion, and $12.6 trillion, respectively. All GDP measures are inflation-adjusted chained-2005 dollars. Recall that Schedule C filers represent around 70% of all business filers from 1988-2007 and small businesses account for "roughly 50% of non-farm GDP each year" (Source: www.irs.gov and www.sba.gov, respectively).

the current-tax rate wage-bill elasticity estimates from Player (2011) as a proxy for the elasticity of taxable business income. This estimate strictly proxies for the elasticity of owner-effort and hence, serves as a lower-bound for the elasticity of taxable business income.[101] Secondly, I compare my elasticity of taxable business income estimates to Feldstein's (1995) estimates for the overall elasticity of taxable income.

I utilize the current-tax rate wage-bill elasticity to proxy for the elasticity of owner-effort or the elasticity of taxable business income. The current-tax rate wage-bill elasticity represents the change in a firm's scale effect. When firm operations are scaled back, business income, or owner-effort will decline proportionally to wages. The validity of this proxy relies on the assumption that any change in the demand for outside labor is proportional to reductions in owner-effort. Assuming the wage bill and business income are affected proportionally when scaling back operations, the wage-bill elasticity estimates can be used to proxy for the reduction in taxable income due to reduced production; hence, the permanent social loss due to tax changes. Utilizing this measure also excludes any income that would still be taxed when it is shifted to another tax-base.

The Player 2011 wage-bill elasticity applies only to firms employing labor. Non-employers lack the data needed in the computation because they have wage bills of zero. The omission of data on non-employers leads to a downwardly biased proxy for the elasticity of owner-effort. The respective median wage-bill elasticities are -0.60 and -0.31 for the respective 1993 and 2001-2003 tax reforms. These estimates are scale effects and

[101]A proxy for owner-effort would also be appropriate when the elasticity of taxable business income includes substantial income shifts to other taxable bases in the economy.

report the percentage change, or contraction, in the wage bill when business owners are faced with a 1% increase in statutory tax rates.

Table 2.5 compares my marginal welfare cost estimates from Table 2.4 to the corresponding estimates when existing literature estimates are used to proxy for the elasticity of taxable business income. All estimates are for employers facing statutory tax changes in the respective base-year. The marginal burden of taxation is reported per employer (or per firm employing labor) in Column 1. Column 2 displays the estimate for the base-year sample and Column 3 displays the estimate for the entire U.S. economy.

Row III, for both 1992 and 2000, displays the marginal cost estimates when the median current-tax rate wage-bill elasticity from Player (2011) is used as the proxy. The current-tax rate wage-bill elasticity is the best available estimate for the elasticity of owner-effort. Therefore, it can serve as a lower-bound for the marginal cost of taxation if the only cost were due to reduced owner-effort. The 1992 per employer estimate of $1,443 is much lower than the per employer estimate using the elasticity of taxable business income ($7,907). Instead of a lower-bound, I can also think of this estimate as isolating the cost of changes on a single margin: owner-effort. In 2000 the estimate is $356 per employer for the elasticity of owner-effort. This is dramatically lower than the estimate using the elasticity of taxable business income which is approximately $4,000. The difference between 1992 and 2000 is most likely due to profitable sole-proprietors (Schedule C filers) reclassifying as S-corporations.[102]

[102] See Figures 3 and 4 for a visual depiction of the Schedule C wage bill data over time.

Rows IV and V utilize the estimates for overall taxable income elasticity from Feldstein (1995). Hence the per employer cost in Rows IV and V is computed using the same data on Schedule C employers but the elasticity estimate for overall income from Feldstein (1995). For computation, Feldstein's reported net-of-tax-rate elasticities are first converted to tax-elasticities for a proper comparison.[103] In Row IV, Feldstein's "Highest AGI" Elasticity of -1.45 yields a welfare cost estimate of $3,476 per employer in 1992 and $1,662 per employer in 2000. The elasticity estimate corresponds to taxpayers in the top-income bracket (AGI≥$250,000). Feldstein's estimate is -1.01 for taxpayers with AGI between $140,000 and $250,000 and is used in Row V. This proxy implies a marginal welfare cost of $2,435 per firm in 1992 and $1,164 in 2000. All comparable estimates in Table 2.5 are statistically different from each other.

8 Two-Sector Model of Labor Displacement

In a one-sector economy the elasticity of taxable business income is the only computation necessary to properly estimate the excess burden of a tax change. However, because owners reduce their demand for outside labor given a rise in taxes, there may be additional distortions created in markets beyond those included in the envelope theorem for the elasticity of taxable business income in a multiple-sector economy.

Labor is released from the small business sector and returns to the aggregate labor market. The welfare cost of labor's transition into other sectors of the economy is not

[103] Feldstein's (1995) net-of-tax-rate elasticity estimates of 1.1, 2.14 and 3.05 are approximately equivalent to tax elasticities of -0.43, -1.01 and -1.45 when I use Feldstein's data to compute percentage changes in tax rates instead of net-of-tax-rates.

included in the statistic for the elasticity of taxable business income. However, the costs of transitioning displaced labor can be bounded and estimated. At one bound, all of the labor is perfectly and costlessly absorbed by other sectors in the economy and there is no additional burden of taxation beyond the measure for the elasticity of taxable business income. The excess burden of taxation is also zero when labor from the small business sector is not suitable for substitution into other sectors, or when the supply of labor is perfectly inelastic. In both scenarios, the wage in the small business sector must adjust to maintain full employment.[104] In this scenario, the change in the small business wage bill would properly measure the tax-incidence borne by employees.

When the aforementioned scenarios do not hold, displaced labor enters unemployment and is gradually absorbed by the rest of the economy. This adjustment is transitional and is in addition to the costs from the elasticity of taxable business income. The theoretical measurement associated with the transition decreases over time from the upper-bound in the short-run and then down to the lower-bound (zero) in the long-run once the new economy-wide long-run equilibrium is reached. In the short-run, the burden of taxation will hug the upper-bound because labor market frictions and job specific training delay labor's absorption into other sectors. As time passes, unemployment benefits end[105], new training can be undertaken by displaced employees, and firms in other sectors have had time to optimally search for new hires. All of these factors push

[104] Tax incidence is not discussed here but will provide a nice extension once each portion of the total cost of taxation is estimated independently. In the case where labor is not substitutable between sectors, employees will bear a large portion of an income-tax hike on their employers.

[105] Unless you are one of the unemployed from the Credit Crunch's 2008 recession where unemployment benefits extend for 99 weeks and you wager that your benefits will be extended further pending the 2012 elections.

the estimate for the additional costs of taxation towards zero in the long-run. Even though the point-estimate for the marginal welfare cost in the long-run may be small, the losses are very real in the short-run and represent a direct reduction in production and wealth for individuals and the economy. Assuming this two-sector economy has no other nonneutral taxes, I can estimate the immediate short-run cost of displaced labor.

8a Welfare Cost Estimation of Displaced Labor in the Short-run

Some small businesses layoff labor in response to income-tax increases. This displaced labor then enters a state of unemployment. Eventually, the labor will be absorbed by other sectors in the economy as the economy approaches a new long-run equilibrium. To measure the instantaneous cost of displaced labor, assume no one finds a new job in the first period (a week). At this time, the competitive wage has not had time to adjust in response to the unemployed labor.

The initial movement is from labor employed before and after the tax change: $(L_1 - L_0) = \frac{\Delta L}{\Delta x} \cdot \frac{\Delta x}{\Delta t} \cdot \Delta t$. Or, $(L_1\text{-}L_0) = \frac{L_0}{x_0} x_0 \cdot \Delta t \cdot \eta_{L,x} \cdot \varepsilon_{x,t}$, where $\eta_{L,x}$ represents the elasticity of demand for labor with respect to output, and $\varepsilon_{x,t}$ represents the semi-elasticity of output with respect to the tax rate.

Once the wage adjusts, the amount of labor employed changes again: $(L_1\text{-}L_2) = \frac{\Delta L}{\Delta w} \cdot \Delta w$.

Or, $(L_1\text{-}L_2) = \frac{L_1}{w} \cdot w \cdot \Delta t \cdot \eta_{L,w}$, where $\eta_{L,w}$ is the elasticity of the demand for labor with respect to the wage rate.

Combining the two, I get:

$$-WC_L = \left\{ t_0 w[(L_1 - L_0) + (L_2 - L_1)] + \frac{1}{2} w \cdot \Delta t (L_2 - L_1) \right\} \Delta t \qquad (2)$$

$$= t_0 w \left[L_0 (\eta_{L,x} \cdot \varepsilon_{x,t}) + L_1 \cdot \eta_{L,w} + \frac{1}{2} L_1 \left(\frac{\Delta t}{t_0} \right) \eta_{L,w} \right] \Delta t$$

$$= t_0 w L_0 \left\{ \varepsilon_{L,t} + \left(\frac{L_2}{L_0} \right) \left[\eta_{L,w} \left(1 + \frac{1}{2} \left(\frac{\Delta t}{t_0} \right) \right] \right] \right\} \Delta t$$

And $\left(\frac{L_2}{L_0} \right) = 1 - \frac{\Delta L}{L_0}$ which equals: $\frac{L_0 - (L_0 - L_2)}{L_0}$, which is: $1-\varepsilon_{L,t} \cdot \Delta t$

where $\varepsilon_{L,t}$ is the elasticity of labor with respect to the tax rate. The elasticity of labor with respect to the tax rate is estimated by Player (2011).

So, $$-WC_L = t_0 w L_0 \left\{ \varepsilon_{L,t} + \left(1 - \varepsilon_{L,t} \cdot \Delta t \right) \eta_{L,w} \left[1 + \frac{1}{2} \left(\frac{\Delta t}{t_0} \right) \right] \right\} \Delta t \qquad (3)$$

Because the wage rate cannot vary in the short-run, $\eta_{L,w}$ =0 and the welfare cost reduces to:

$\Delta WC_L = t_0 \cdot w \cdot L_0 \cdot \varepsilon_{L,t} \cdot \Delta t$, where $(w \cdot L_0)$ is the bi-monthly wage bill. Utilizing the mean and median wage-bill elasticity estimates from Player (2011), I calculate the firm-level welfare cost for each observation in my 1992-1994 and 2000-2004 samples.

By definition, in the short-run, any displaced labor has not had time to be absorbed by other sectors in the economy and wages have not adjusted. The instantaneous cost is the first of the welfare costs associated with the economy's transition to a new long-run equilibrium. The lower-bound for the short-run cost of displaced labor is zero. The cost approaches zero the more quickly and costlessly displaced labor is absorbed by the rest of the economy. It also approaches zero as the elasticity of supply of outside labor becomes perfectly inelastic.

Table 2.6 displays the sample level marginal welfare cost associated with labor displaced from the small business sector due to reduced owner-effort in firms when taxes rise. For the 1993 reforms, the per firm (or per employer) cost is around $87 when the minimum duration of unemployment is assumed to be two-weeks.[106] For the 1992 sample, this loss ranges from $796,822 for the mean wage-bill elasticity, to $1.02 million for the median wage-bill elasticity. The per firm welfare cost of the 2001-2003 tax decreases is approximately $54. For the entire 2000 sample, the cost is estimated to fall between $280,735 for the mean and $322,326 for median wage-bill elasticity.[107] Extrapolating to the U.S. tax-filing population, the 10% random sample equates to a median cost of $10 million for 1993 reforms and $3.2 million for 2001-2003 reforms.[108]

9 Estimates for the Total Welfare Cost due to Tax Rate Changes on Small Businesses

To review, the elasticity of taxable business income sufficiently estimates the annual long-run incremental cost of a permanent income tax increase on small businesses. The elasticity of taxable business income encompasses the costs of changes in

[106] Table 6 shows the instantaneous cost for the first two-weeks (bi-monthly) when labor is displaced. This implicitly assumes a minimum duration of unemployed of two-weeks. The estimates can be easily adjusted to account for different assumptions regarding the minimum length of unemployment (one week, one month, etc.).

[107] It is difficult to justify isolating the 2001 reforms from the 2003 reforms because the 2001 rate decreases were expected to phase-in gradually through 2006. The entire tax rate change for both reforms occurs between 2001 and 2003.

[108] A more robust analysis would model and incorporate labor's absorption path into other sectors of the economy. The dollar estimates from such an analysis would vary dramatically based on the chosen magnitudes for variables like unemployment duration, the real interest rate, and expected inflation.

owner-effort, business expenses and business deductions.[109] The short-run or instantaneous cost to society when labor is displaced from the small business sector is not included in the elasticity of taxable business income. This additional cost occurs when employers change the scale of the firm, altering their own effort and demand for outside labor.

Table 2.7 summarizes the main estimates of the paper. The high and low estimates for the elasticity of taxable business income come from Table 2.4 which uses the elasticity of taxable business income estimates from the 1992 and 2000 data on employers facing income-tax changes. The instantaneous cost of displaced labor comes from Table 2.6 where the mean and median wage-bill elasticity estimates from Player (2011) are utilized to estimate the impact on labor when small business owners alter the scale of the firm's operations. The high estimates are from the median wage-bill elasticity and the low estimates are from the mean wage-bill elasticity.[110] The data are a 10% stratified random sample; therefore, the cost borne by the economy is simply ten times the cost borne in the sample.

10 Conclusion

I have provided two analyses to estimate the excess burden of taxation on small business employers associated with the OBRA-1993 and JGTRRA 2001-2003 tax

[109] When a large proportion of the change in taxable business income is due to shifts to other taxable bases in the economy, the elasticity of taxable business income will overstate the true welfare cost.

[110] The lower-bound for the short-run cost of displaced labor is zero. The cost approaches zero the more quickly and costlessly displaced labor is absorbed by the rest of the economy. It also approaches zero as the elasticity of the labor supply-curve becomes perfectly inelastic.

reforms. The difference-in-difference analysis uses pooled cross-sectional tax return data surrounding each respective tax reform to estimate the elasticity of taxable business income which can be used to measure the permanent change in welfare. The elasticity of taxable business income for the top income-tax bracket is -3.29, and it is -5.39 for employers in the next highest tax-bracket in 1992. The estimate for the top income-tax bracket is -4.84 in 2000, and it is -3.53 for the next highest tax-bracket.

Using my elasticity of taxable business income estimates, I calculate the excess burden of personal income taxes on small business employers to be $920 million for the 1993 reforms and $244.5 million for the 2001-2003 reforms. The difference in total marginal welfare costs between the 1993 and 2001-2003 reforms is attributed to the changing distribution of Schedule C filers over time.

For robustness, my estimates are compared with estimates from the existing literature for the elasticity of owner-effort (Player 2011) and the overall elasticity of taxable income (Feldstein 1995). A proxy for the elasticity of owner-effort provides the lower-bound for my welfare cost estimates. Secondly, the overall elasticity of taxable income (Feldstein 1995) shows that business income does indeed appear to be more elastic than other sources of income. This implies tax increases on business income will yield little to negative revenue increases and will come with the cost of large deadweight-losses. For revenue generation, the government may want to target other sources of income that are not as elastic.

I also estimate the cost of displaced labor when employers alter the scale of the firm due to taxation. This cost is separate from the welfare cost associated with the

elasticity of taxable business income. When labor supply is perfectly inelastic *or* displaced labor is costlessly absorbed by the rest of the economy, the cost of displaced labor is zero. I estimate the instantaneous cost of displaced labor to be $10 million for the 1993 reforms and $3.2 million for the 2001-2003 reforms.

Future research could focus on the selection away from the Schedule C, whether all flow-through entities respond homogenously to tax changes, and identifying more inelastic sources of adjusted gross income.[111]

[111] Feldstein's overall estimate for the elasticity of taxable income is approximately -1.45 which implies some income sources must be less elastic than taxable business income. The category "wages, tips and salaries" is probably a relatively inelastic source of AGI as evidenced by the many Federal taxes already targeting wages: social security, Medicaid/Medicare, etc.

Table 2.1a
Summary Statistics for Schedule C Employers 1992-1994

Variable	1992	1994
Tax Rate		
Mean	20.60%	23.03%
Median	28.00%	28.00%
(Std. Dev.)	*(12.28)*	*(14.22)*
Taxable Business Income		
Mean	$183,362	$178,917
Median	$59,891	$62,908
(Std. Dev.)	*($603,821)*	*($544,498)*
Wage Bill		
Mean	$242,074	$200,589
Median	$77,097	$74,720
(Std. Dev.)	*($802,238)*	*($472,857)*
Self-Employment Income		
Mean	$39,987	$42,952
Median	$40,357	$46,151
(Std. Dev.)	*($33,709)*	*($34,523)*
Adjusted Gross Income (AGI)		
Mean	$233,561	$215,134
Median	$103,332	$102,799
(Std. Dev.)	*($4,715,579)*	*($2,258,975)*
Gross Receipts (Schedule C)		
Mean	$1,451,427	$1,255,608
Median	$553,019	$522,564
(Std. Dev.)	*($3,632,818)*	*($2,845,292)*
Depreciation		
Mean	$40,972	$34,422
Median	$11,149	$10,516
(Std. Dev.)	*($192,571)*	*($98,048)*
Observations	14,800	7,304

Note: The probability of any Schedule C filer employing labor in 1992 is 29.88%. In 1994 it is 29.59%. The probability of a Schedule C filer claiming self-employment income is 75.84% in 1992 and 78.26% in 1994.

Table 2.1b
Summary Statistics for Schedule C Employers 2000-2004

Variable	2000	2004
Tax Rate		
Mean	25.00%	19.94%
Median	28.00%	25.00%
(Std. Dev.)	*(14.77)*	*(13.66)*
Taxable Business Income		
Mean	$202,045	$190,027
Median	$73,407	$51,338
(Std. Dev.)	*($650,114)*	*($1,110,137)*
Wage Bill		
Mean	$293,102	$338,154
Median	$103,165	$118,790
(Std. Dev.)	*($989,346)*	*($834,768)*
Self-Employment Income		
Mean	$48,482	$43,939
Median	$51,521	$34,126
(Std. Dev.)	*($40,787)*	*($41,849)*
Adjusted Gross Income (AGI)		
Mean	$633,431	$782,642
Median	$150,216	$115,622
(Std. Dev.)	*($3,430,136)*	*($7,438,947)*
Gross Receipts (Schedule C)		
Mean	$1,921,972	$2,087,495
Median	$677,960	$792,138
(Std. Dev.)	*($14,500,000)*	*($6,342,496)*
Depreciation		
Mean	$44,269	$69,877
Median	$10,779	$13,172
(Std. Dev.)	*($166,059)*	*($262,796)*
Observations	7,474	7,380

Note: The probability of any Schedule C filer employing labor in 2000 is 25.47%. In 2004 it is 24.01%. The probability of a Schedule C filer claiming self-employment income is 76% in 2000 and 70.39% in 2004.

Table 2.1c
Current Tax Rate Wage-Bill Elasticity

	1992-1994	2000-2004
Mean Elasticity	-0.47	-0.27
Median Elasticity	-0.60	-0.31

Note: Estimates are from Player 2011. Elasticities are average point-estimates that use the mean or median salary expense for the respective observations. The elasticity estimates for tax increases of 1993 are statistically different than the tax decreases in 2001-2003.

Table 2.2
The Elasticity of Taxable Business Income with respect to Statutory Tax Rates for Schedule C Employers for the 1993 Reforms

	(1) High AGI≥ $250,000	(2) Mid AGI≥ $140,000 and AGI < $250,000	(3) Low AGI < $140,000	(4) High - Low (1)-(3)	(5) Mid - Low (2)-(3)
% Change in Tax Rate					
Mean	24.36%	14.93%	0.00%	-	-
Median	24.36%	14.93%	0.00%	-	-
% Change Taxable Business Income					
Mean	2.39%	2.05%	82.47%	-80.08%	-80.42%
Median	-5.08%	-2.28%	7.31%	-12.39%	-9.59%
Observations (1992)	3,410	1,300	10,090		
Observations (1994)	1,449	739	5,116		
Elasticity of Taxable Business Income					
Mean				-3.29	-5.39
Median				-0.51	-0.64

Note: High AGI represents employers with adjusted gross income greater than or equal to $250,000 in chained-inflation adjusted 2005 dollars. Mid AGI represents employers with AGI under $250,000 and greater than or equal to $140,000. Low AGI represents employers with AGI below $140,000. For the 1993 reforms, taxpayers with AGI < $140,000 did not face any tax rate changes. This does not include individuals facing a 0% statutory tax rate.

Table 2.3
The Elasticity of Taxable Business Income with respect to Statutory Tax Rates for Schedule C Employers for the 2001-2003 Reforms

	(1) **High** AGI≥ $250,000	(2) **Mid** AGI≥ $140,000 and AGI < $250,000	(3) **Low** AGI < $140,000	(4) **No Tax Rate Change**	(5) **High - No Change** (1)-(4)	(6) **Mid - No Change** (2)-(4)	(7) **Low - No Change** (3)-(4)
% Change in Tax Rate							
Mean	-12.33%	-8.70%	-12.30%	0.00%	-	-	
Median	-12.33%	-8.70%	-11.32%	0.00%	-	-	
% Change Taxable Business Income							
Mean	23.93%	-5.03%	-11.47%	-35.77%	59.70%	30.74%	24.30%
Median	11.17%	-5.26%	2.66%	-1.64%	12.81%	-3.63%	4.29%
Observations (2000)	2,190	819	3,007				
Observations (2004)	2,091	436	2,670				
Elasticity of Taxable Business Income							
Mean					-4.84	-3.53	-1.98
Median					-1.04	0.42	-0.38

Note: High AGI represents employers with adjusted gross income greater than or equal to $250,000 in chained-inflation adjusted 2005 dollars. Mid AGI represents employers with AGI under $250,000 and greater than or equal to $140,000. Low AGI represents employers with AGI below $140,000 but not in the lowest tax bracket because the lowest tax bracket did not have a rate reduction. Column 4 includes employers not facing any tax rate changes with AGI below $140,000. This does not include individuals facing a 0% statutory tax rate.

Table 2.4
Welfare Cost of Tax Reforms on Small Business Employers using Elasticity of Taxable Business Income Estimates

Table 4 shows the change in welfare cost from each tax reform which is computed using the Harberger analysis in Equation 1, Section 5. The estimates are for employers facing statutory tax changes in the respective base year (not for small businesses not employing labor or employers not facing tax rate changes). The marginal excess burden of taxation is reported per employer (or per firm employing labor) in Column 1. Column 2 displays the estimate for the base-year sample and Column 3 displays the estimate for the entire U.S. economy in the base year. The differenced elasticity estimates for low to mid to high AGI employers are utilized to provide a range of estimates in the marginal welfare cost calculation.

	Welfare Cost: 1992		
	(1)	(2)	(3)
	Per Employer	**Sample**	**U.S. Economy**
Elasticity of Taxable Business Income			
Estimate for "High AGI" = 3.29	$7,907	$92,065,786	$920,657,856
Estimate for "Mid AGI" = 5.39	$12,961	$150,917,514	$1,509,175,141
Observations	11,644		
	Welfare Cost: 2000		
Elasticity of Taxable Business Income	**Per Employer**	**Sample**	**U.S. Economy**
Estimate for "High AGI" = 4.84	$5,567	$33,489,665	$334,896,648
Estimate for "Mid AGI" = 3.53	$4,065	$24,452,476	$244,524,762
Estimate for "Low AGI" = 1.98	$2,273	$13,671,684	$136,716,840
Observations	6,016		

Note: All figures are indexed for inflation and are 2005-chained dollars.

Table 2.5
Lower-Bound Estimation and Robustness Checks using Literature Estimates

Table 5 compares my marginal welfare cost estimates from Table 4 to the corresponding estimates if other estimates are used to proxy for the elasticity of taxable business income. Rows III display the marginal cost estimates when the median current-tax rate wage-bill elasticity from Player (2011) is used as the proxy. The current-tax rate wage-bill elasticity is the best available estimate for the elasticity of owner-effort. Therefore, it can serve as a lower-bound for the marginal cost of taxation if the only cost were due to reduced owner-effort. Rows IV and V use the estimates for overall taxable income elasticity from Feldstein (1995). Hence the per employer tax in Rows IV and V is computed using the same data on Schedule C employers but the elasticity estimate for overall income. Feldstein's net-of-tax-rate elasticities are first converted to tax-elasticities for a proper comparison. All estimates are for employers facing statutory tax changes in the respective base year. The marginal burden of taxation is reported per employer (or per firm employing labor) in Column 1. Column 2 displays the estimate for the base-year sample and Column 3 displays the estimate for the entire U.S. economy in the base year.

		Welfare Cost: 1992		
		(1)	(2)	(3)
		Per Employer	**Sample**	**U.S. Economy**
Elasticity of Taxable Business Income				
I.	Estimate for "High AGI" = 3.29	$7,907	$92,065,786	$920,657,856
II.	Estimate for "Mid AGI" = 5.39	$12,961	$150,917,514	$1,509,175,141
Lower-Bound & Robustiness Checks				
III.	Current-Tax Rate Wage-Bill Elasticity	$1,443	$16,805,785	$168,057,852
IV.	Feldstein "Highest AGI" Elasticity	$3,476	$40,473,933	$404,739,327
V.	Feldstein "High AGI" Elasticity	$2,435	$28,348,559	$283,485,587
	Observations	11,644		
		Welfare Cost: 2000		
Elasticity of Taxable Business Income		**Per Employer**	**Sample**	**U.S. Economy**
I.	Estimate for "High AGI" = 4.84	$5,567	$33,489,665	$334,896,648
II.	Estimate for "Mid AGI" = 3.53	$4,065	$24,452,476	$244,524,762
Lower-Bound & Robustiness Checks				
III.	Current-Tax Rate Wage-Bill Elasticity	$356	$2,144,458	$21,444,584
IV.	Feldstein "Highest AGI" Elasticity	$1,662	$9,995,943	$99,959,433
V.	Feldstein "High AGI" Elasticity	$1,164	$7,001,311	$70,013,109
	Observations	6,016		

Note: All figures are indexed for inflation and are 2005-chained dollars.

Table 2.6
The Instantaneous Welfare Cost of Displaced Labor from the Small Business Sector

	1992			2000		
	(1)	(2)	(3)	(4)	(5)	(6)
	Per Employer	**Sample**	**U.S. Economy**	**Per Employer**	**Sample**	**U.S. Economy**
Mean Wage Bill Elasticity	-0.47			-0.27		
Short-run Welfare Cost	$68	$796,822	$7,968,222	$47	$280,735	$2,807,353
Median Wage Bill Elasticity	-0.60			-0.31		
Short-run Welfare Cost	$87	$1,017,220	$10,172,198	$54	$322,326	$3,223,257
Observations	11,644			6,016		

Note: All figures are indexed for inflation and are 2005-chained dollars.

Table 2.7
Summary of the Marginal Welfare Cost of Taxation on Small Business Employers: Elasticity of Taxable Business Income & Displaced Labor

Table 7 summarizes the main estimates of the paper. The high and low estimates for the elasticity of taxable business income come from Table 4 which uses the elasticity of taxable business income estimates from the 1992 and 2000 data on employers facing income tax rate changes. The instantaneous cost of displaced labor comes from Table 6 where the mean and median wage-bill elasticity estimates from Player (2011) are utilized to estimate the impact on labor when small business owners alter the scale of the firm's operations. The high estimates are from the median wage-bill elasticity and the low estimates are from the mean wage-bill elasticity. The data are a 10% stratified random sample; therefore, the cost borne by the economy is simply ten times the cost borne in the sample.

	1993 Tax Reforms			2001-2003 Tax Reforms		
	(1)	(2)	(3)	(4)	(5)	(6)
Marginal Welfare Cost	**Per Employer**	**Sample**	**U.S. Economy**	**Per Employer**	**Sample**	**U.S. Economy**
1. Elasticity of Taxable Business Income						
High Estimate:	$12,961	$150,917,514	$1,509,175,141	$5,567	$33,489,665	$334,896,648
Low Estimate:	$7,907	$92,065,786	$920,657,856	$4,065	$24,452,476	$244,524,762
2. Instantaneous Cost of Displaced Labor						
High Estimate:	$87	$1,017,220	$10,172,198	$54	322,326	$3,223,257
Low Estimate:	$68	$796,822	$7,968,222	$47	280,735	$2,807,353
Observations:	11,644			6,016		

Note: All figures are indexed for inflation and are 2005-chained dollars.

Figure 2.1 - Historical Tax Brackets and Tax Rates

Personal Income Tax Brackets 1988-2005 for Married filing Jointly

1988-1990*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$29,750
28.0%	$29,750	$71,900
33.0%	$71,900	$149,250
28.0%	$149,250	-

1991-1992*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$34,000
28.0%	$34,000	$82,150
31.0%	$82,150	-

1993-2000*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$36,900
28.0%	$36,900	$89,150
31.0%	$89,150	$140,000
36.0%	$140,000	$250,000
39.6%	$250,000	-

2001

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
15.0%	$0	$45,200
27.5%	$45,200	$109,250
30.5%	$109,250	$166,500
35.5%	$166,500	$297,350
39.1%	$297,350	-

2002

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
10.0%	$0	$12,000
15.0%	$12,000	$46,700
27.0%	$46,700	$112,850
30.0%	$112,850	$171,950
35.0%	$171,950	$307,050
38.6%	$307,050	-

2003-2005*

Marginal Tax Rate	Income Brackets	
	Over	*But Not Over*
10.0%	$0	$14,000
15.0%	$14,000	$56,800
25.0%	$56,800	$114,650
28.0%	$114,650	$174,700
33.0%	$174,700	$311,950
35.0%	$311,950	-

*Income ranges are listed for the first year and are adjusted for inflation in consecutive years.

Figure 2.2 – Anticipated Tax Brackets and Tax Rates 2001-2010

Proposed Changes in Tax Rates 2001-2010 (under EGTRRA 2001) for Married Filing Jointly

Tax Rate prior to July 1, 2001			**Tax Rate July 1, 2001 -2003**			**Tax Rates 2004-2005**			**Tax Rates 2006-2010**		
Marginal	Income Brackets		Marginal	Income Brackets		Marginal	Income Brackets		Marginal	Income Brackets	
Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*	Tax Rate	*Over*	*But Not Over*
0.0%	$0	$26,350	10.0%	$0	$12,000	10.0%	$0	$14,300	10.0%	$0	$14,000
15.0%	$26,350	$63,550	15.0%	$12,000	$46,700	15.0%	$14,300	$58,100	15.0%	$14,000	$56,800
28.0%	$63,550	$132,600	27.0%	$46,700	$112,850	26.0%	$58,100	$117,250	25.0%	$56,800	$114,650
31.0%	$132,600	$208,350	30.0%	$112,850	$171,950	29.0%	$117,250	$178,650	28.0%	$114,650	$174,700
36.0%	$208,350	$288,351	35.0%	$171,950	$307,050	34.0%	$178,650	$319,100	33.0%	$174,700	$311,950
39.6%	$288,351	-	38.6%	$307,050	-	37.6%	$319,100	-	35.0%	$311,950	-

*Income ranges are listed for the first year only.

Figure 2.3 –Kernel Density Estimate for Wage Bill > $5million, 1992-1994

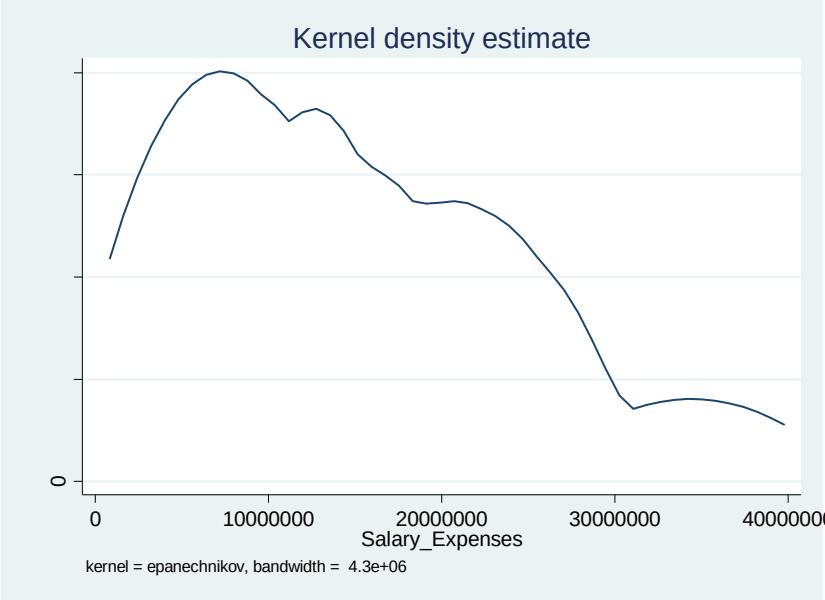
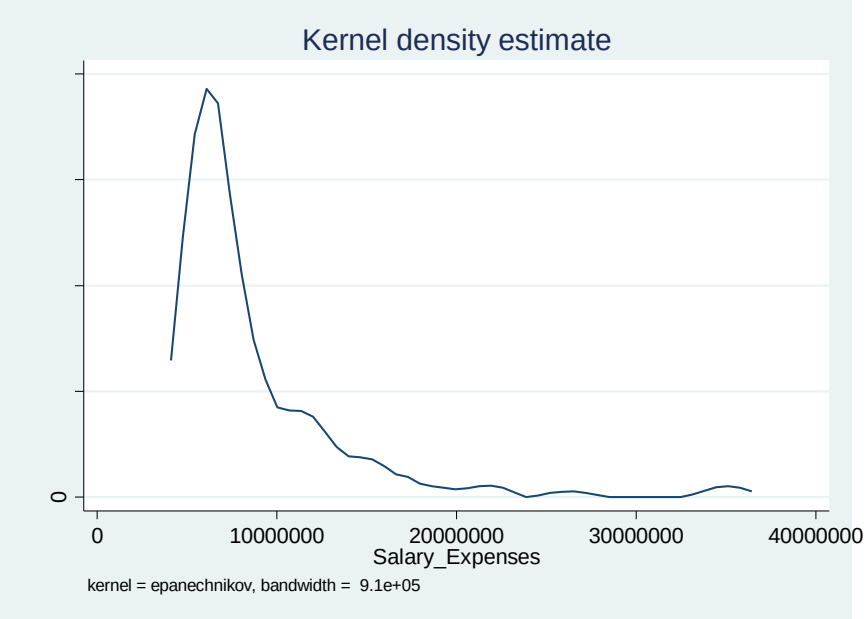


Figure 2.4 –Kernel Density Estimate for Wage Bill > $5million, 2001-2004



CHAPTER 3

THE VALUE OF RESIDENTIAL COMMUNITY ASSOCIATIONS: AN EMPIRICAL REVIEW

1 Introduction

The trend towards residential communities with privately provided amenities and services began after World War II and has continued over the past two decades. Residential community associations (RCAs) include homeowners' associations, condominium associations and cooperative associations. RCAs finance projects through neighborhood fees that supplement or replace local government goods, services and governance. Despite the rising popularity of RCAs, the associations tend to receive negative media attention and have been scrutinized for exerting their rights to issue punishment fees and place liens on member properties.[112]

The high level of scrutiny is seemingly at odds with the fact that individuals in RCAs originally chose to live there and signed all of the governing documents prior to becoming residents. The existing RCA literature focuses on RCA efficiency, which may have implications to guide court judgments. Theoretically, RCAs provide and price goods and services that residents value when property buyers are fully aware of the effect RCA affiliation has on property value. Differently sized RCAs could lend insight into how agency costs change with the number of residents. RCAs with different voting systems and by-laws could provide cross-sectional evidence of the value-added through lenient or strict governance.

[112] For examples, search the Internet for "HOA scrutinized". In one example, a Texas HOA issued a fee to an ex-military member flying the American flag. The state of Texas changed the legal scope of HOAs in response to the case in late 2011 (Hiller 2012).

I examine the sales prices of single-family houses for three Spartanburg County RCAs and the sales prices for the RCAs' most comparable non-RCA neighborhoods. The comparison of non-RCA data and RCA data allows me to examine the relative average value of a RCA. RCAs appear to increase property values by 2.2% in my sample. I then examine one neighborhood with 120 houses that has a mandatory homeowners' association for 30 lakefront properties. Homes in this particular RCA sell at a 3.8% premium to the other homes in the neighborhood. This is the capitalized net benefit of living on, and accessing the lake.

I also review and critique the existing empirical literature on RCA efficiency and discuss the theoretical hurdles of applied research in the area.[113] I show that the existing literature is downwardly biased because it omits a variable for the age of the property. "Age" is an important variable to include because it proxies for many other determinants of property value that are difficult to explicitly quantify. For example, the variable "age" can proxy for location, architectural-style and quality, and projected maintenance costs.

A brief history of RCAs is presented in Section 2. Section 3 outlines RCA theory and Section 4 discusses many of the problems with the existing empirical research. Section 5 presents the empirical specification and the data are discussed in Section 6. I discuss my findings in Section 7 and Section 8 concludes.

[113] Langbein et al. (2004) and Agan and Taborrak (2005) are the only empirical papers on the efficiency of RCAs, to my knowledge, at this time. In Appendix A, I revisit the Langbein et al. (2004) data, and include a variable for condominium age. The inclusion of "condo age" erases all results of inefficiency reported by the original study.

2 RCA Background

Residential Community Associations began after World War II and gained popularity in the U.S. during the 1950s and 1960s.[114] Real estate developers recognized the demand for inexpensive housing not available in cities. Suburbs with RCAs began to develop, offering more and more amenities to entice people to leave the city and reside in the "all-inclusive" neighborhoods.

A RCA provides a small segment of a city's total population with "public goods". In a homeowners' association, public goods may include community rules and activities, common area maintenance and landscaping, swimming pools, putting greens, and local lobbying services. RCAs often perform some "local government" duties like snow removal, sewage disposal and trash pick-up. Many of the first RCAs were essentially live-in country clubs or retirement neighborhoods. RCA affiliation was the province of affluence with the amenities to match.[115]

In the 1980s middle-income consumer demand for traditional housing substitutes grew, and RCA developers responded. Nearly 100,000 RCAs were formed in the 1980s, offering fewer amenities and services at lower prices to attract middle-income consumers (Dilger 1991). The distribution of RCA diversity increased tremendously from the original country clubs and retirement villages to a wide range of service bundles. Dilger (1992) notes that by the end of the 1980s, "Residential community associations…ranged in size and responsibilities from a few homes on a single street that collectively provide

[114] See Dilger (1991) and Dilger (1992) for a full discussion.
[115] See Dilger (1991) and Dilger (1992) for a full discussion.

only one or two services to thousands of homes comprising a mid-size city such as Reston, Virginia, that offers dozens of services."

Over the past 15 years, the number and power of RCAs has grown. In 2008 there were over 300,000 registered RCAs in the United States.[116] In 2001, 50 million people in the U.S. belonged to at least one of these small quasi-governmental organizations.[117]

RCAs are presumably a way to increase the utility derived from, and therefore, the value of a property. RCAs operate under a set of "club-like" conditions with their own by-laws and governance. RCAs have the legal power to place liens on residential properties and foreclose on residents when the RCA by-laws are broken. These legal powers help negate potential free-rider problems. A purchaser buying into a RCA wants the association to be able to collect delinquent payments and fees so the unpaid portions will not be shifted to the other fee-paying property owners.

A residential developer typically sets the scope of the RCA and the amenities it offers. Because the developer initiates the RCA, he retains some, if not majority, voting rights until about half of the property units are sold to individual owners or investors.

Initial research on RCAs was purely theoretical. In separate books, Tullock (1970) and Foldvary (1994) argue that RCAs and other small local voluntary organizations are presumably efficient. Foldvary (1994) performs three case studies of decentralized local government activity in the United States.[118] Alternatively, Helsley and

[116] Source: Community Associations Institute (CAI), http://www.caionline.org/Pages/Default.aspx

[117] Individuals owning multiple properties could be members of several different associations. Source: Community Associations Institute (CAI), http://www.caionline.org/Pages/Default.aspx

[118] One of the cases is a condominium association in Alexandria, Virginia which is similar in location to the associations studied by Langbein et al. (2004).

Strange (1998) apply political and special-interest group theories to the theory of RCAs. This is particularly due to the use of rent-seeking by board members. However, they do not attempt to evaluate the relative efficiency of RCAs: RCAs may be inefficient compared to a welfare maximizing equilibrium while being relatively more efficient than an existing benchmark like the local government.

Dilger (1992) reviews RCAs in practice and their relationship with local governments on issues like taxation, financing, and governance. On taxation, the issue of the double-taxation of benefits arises: residents pay RCA fees and property taxes. Some local governments rebate a portion of the property tax to account for the privately provided services (trash/snow removal).[119] With respect to financing, Dilger (1992) argues that if RCAs increase property values, local government tax revenues are augmented because most property taxes are based on fair-market valuations. In this case, RCAs subsidize activities that the local government would typically provide. Thus, the local government may have a vested interest in the success of local RCAs.

Foldvary (1994) writes that the privatization of local government services by RCAs is due to "unregulated private policy-making" and that "private communities unite governance with market competition in the provision of public goods." RCAs are a product of Tiebout sorting and occur from the bottom-up, in contrast to the top-down approach typically undertaken by larger government bodies. Local governments may be forced to become more efficient to compete with private RCAs when the two forms of governance offer similar products and services.

[119] Additionally, even though local governments and RCAs provide similar services, property taxes are deductible from federal income taxes whereas RCA fees are not tax-deductible.

My focus in this paper is on the empirical value of RCAs for which the existing literature has provided only preliminary results. Langbein et al. (2004) conclude that RCAs are inefficient but do not produce convincing or significant results. They use property values (condominium sales) to test the efficiency of RCAs, measured by the association's fee level. They perform an old-fashioned hedonic pricing model without accounting for selection and endogeneity. Extrapolating from their results, Langbein et al. (2004) speculate that RCAs over-provide services or charge too much for the services provided. They assert that RCAs face a greater oversight and management problem than local governments.[120]

The second empirical analysis on the efficiency of RCAs is by Agan and Tabarrok (2005). Analyzing a dataset containing observations both in and outside of RCAs, they compare RCA property values to properties under the local government's jurisdiction. They estimate that RCAs increase sales prices for members by 5.4% relative to similar houses not under an association's governance.

3 RCA Decision-Making

Inefficiencies pertaining to group decision-making are expected to increase with group size. In the absence of competition, a large collective body will be less efficient than a small collective group of decision-makers. The relative inefficiency of a large

[120] Langbein et al. (2004) also look at the relative efficiency of RCAs with more or less community involvement and more or less professional management services. They find that higher RCA fees reduce average property values and that professional management, as opposed to a community-run RCA board "mitigates the property value losses due to RCA inefficiency". Their results appear to show that professional management constrains fee levels as well as the "over provision" of services.

RCA to a small RCA, or a RCA to a local government, should be capitalized in property values (sales prices). An association has two choices after collecting dues:[121]

The RCA can spend the money on goods public to the community *and* valued by the residents. In this case, a cost-minimizing RCA operates like a firm and property values (stock prices) increase relative to other neighborhoods, ceteris paribus. Alternatively, after collecting dues the RCA or manager can throw the collections away (or spend collections on services that are not valued by residents). Here, the lost funds will be fully capitalized in the value of the property and property values under the RCA's jurisdiction will decrease relative to other non-RCA properties.

Of course, any outcome between the two extremes is also possible. In the first scenario, buyers are only willing to pay a premium for a property when the RCA is more attractive than competitor RCAs (or local governments). The relative value of goods provided is what determines the premium. In the second scenario, even if all RCAs wasted the dues, all property values would still be observed to decrease by the entire capitalized value of the dues, and there would be no difference in values across the different RCAs.

3a RCAs vs. Local Government Property Values

Assume two identical properties receiving one identical service: perfectly homogenous trash removal. Trash removal can be paid for by city taxes or by RCA fees, depending on the jurisdiction. This enables the researcher to examine property values

[121] This decision-making process is virtually identical to a local government that collects property taxes.

between the local government and RCA because the only difference between the properties is the jurisdiction in which each exists.

With identical properties, location and services, any differences in property values will be solely due to differences in the costs of serving (the taxes or RCA fees paid). The difference in yearly taxes and yearly RCA fees will be fully capitalized in the present valuation of a given property. If the property paying local government taxes is valued more highly than the RCA property then the local yearly property taxes are lower than the yearly RCA fees. The relative inefficiency is captured in market values. The reverse is true when the RCA property is worth more than the local government property.

Theoretically, the value of a residential property, whether under the local government or an RCA, or both, will be a function of square footage, the number of bedrooms, the number of bathrooms, lot size, taxes, RCA fees, a dummy variable for the presence of an RCA, property age, the location, and potentially the number of other properties under the same local service provider (a measure of dwelling supply).[122] Taxes or RCA fees could be replaced with the number of services provided, the quality of services, delivery or administrative efficiency, and the number of houses in the RCA. This comes from the mathematical identity that Total Revenue must equal Total Expenses.

[122] The number of units can also represent economies of scale in the provision of services. An RCA has to reach some critical mass at which point it becomes less costly for the RCA to provide the service instead of individuals or the local government.

RCA fees and local government taxes are both functions of the quality and number of services provided and administrative efficiencies and the number of properties in the jurisdiction. When quality goes up, total spending on services increases.

Taxes or fees increase with increases in the number and quality of services provided. Taxes or fees decrease with additional units up to the point of minimum average cost and increases in administrative efficiency. When quality is increased, holding taxes or fees constant, property values increase; furthermore, if administrative efficiency is increased, *ceteris paribus*, property values increase.

When the number of services and quality are allowed to vary between the two identical properties, the resulting capitalization becomes much more ambiguous. Returning to the trash removal example, with different qualities between the RCA and the local government, higher quality will increase property values while lower administrative efficiency reduces property values.[123] The source of capitalization cannot be addressed unless either quality or administrative efficiency is completely identified.

Given identical taxes and RCA fees, when RCAs have lower administrative efficiencies compared with the local government but also have higher quality services, the property values could be identical for two very different products, or the values may differ but without proper controls we will not be able to separately identify the two effects.

[123] Quality can refer to the number of pick-up days per month, the distance between the house and the pick-up location, etc.

4 Problems with Empirical Research on RCA Efficiency

The empirical and theoretical problems for researchers empirically analyzing the efficiency of RCAs include: identifying a comparable benchmark, local government competition and joint decision-making, the number and quality of amenities provided, and RCA and local government overlap.

The empirical researcher must be wary about the baseline chosen for purposes of comparison. For instance, if all RCAs or local governments spend and tax with the same level of efficiency, the tax will be fully capitalized in all real estate prices and no comparative differential will be found. However, if RCAs are relatively less efficient than local governments, only RCA properties will reflect the capitalized RCA fees (taxes). When RCAs are relatively more efficient than local governments, RCA property values should be higher than non-RCA properties. Empirical work with the Tiebout model shows that in the case of inefficient taxation and spending, the lost value should be fully capitalized in residential real estate prices (property values).

Econometrically, the comparison group is vital to the model. Interpreting the resulting coefficients will depend on the relevant baseline group. Detailed knowledge of the comparison group's characteristics will be necessary for proper interpretation and for inferring policy implications. For instance, constructing a reliable benchmark is more difficult for condominiums than single-family homes because most condominiums have common areas subject to a property association.

In theory, the more RCAs in a given area, the more successful Tiebout sorting will be, thanks to a wider range of choices over preferred services and amenity bundles.

With greater imperfections in selection, the greater the discount buyers must receive to "buy in" to a sub-optimal RCA or local government.

Furthermore, the comparison group, the local government, coexists with RCAs. Researchers cannot observe local government decisions and efficiency levels in the absence of RCAs. Local governments probably improve efficiency when faced with competition from local RCAs. Local government behavior with RCA competition is very different from that without RCA competition. This complicates determining the relative efficiency of RCAs because the presence of an RCA can signal a "bad" local government. In this case, the existence of an RCA is endogenous.

Local governments also compete with other local governments. Therefore, even when a local government does not compete directly with an RCA, it competes indirectly by competing with other local governments that do contain RCAs.

The researcher must be careful in both cases to control for services or amenities offered by both the RCA and the local government. Some of the difference in property values could be due to differences in amenities rather than differing administrative efficiency. It may be the case that RCAs offer amenities and services that local governments cannot. In these cases, the difference in valuation could be due to different amenities *or* different management efficiencies. One example may be the restrictions RCAs place on the aesthetic appearance of properties. Analyzing efficiency is complicated further when local governments offer different services than RCAs.

The quality of amenities across RCAs and local governments varies. When RCA quality is better than local government quality, people are willing to pay a premium for

RCA amenities. Alternatively, when the price of the service is the same for local governments and RCAs but there is some difference in the channel of distribution that affects the quality (customer service, timeliness, less bureaucratic red-tape), any valuation premium will be observed as higher property values.

Furthermore, many RCAs perform the duties of the local government, which means some of the services and fees paid may overlap with local taxes and services. To mitigate the potential for double-taxation, some RCA properties may not have to pay 100% of local government taxes because of the services provided by the RCA. Local tax rebates to the RCA for sewage, snow removal and trash pickup are common. The correct, or incorrect, pricing of these services layers another level of complexity and will at best require simplifying assumptions.

4b Problems with Existing Empirical Research

Ideally, any model examining the efficiency of RCAs would test whether the presence of an RCA raises or lowers property values (sales prices) relative to not having the RCA. Langbein et al. (2004) examine the effect of RCA fees on sales prices. Holding RCA fees constant, the authors find that RCAs providing more services and amenities have lower sales prices.

First, Langbein et al. (2004) use subjective board rankings of community involvement (2001) to measure RCA citizen oversight. Theoretically, RCAs with more active members will demand higher efficiency from management, so the management will shirk relatively less than an RCA with inactive members. The Langbein et al. (2004) community-involvement rankings do not include controls for the frequency of RCA

services or quality, or how the RCA has changed over the past three years. Each board of directors self-reports the survey data and it is not an objective or relative measurement for community involvement.

Not only do RCAs compete with the local government for fee-paying residents, they also compete among themselves. Any given consumer can decide to live under the local government's jurisdiction or can choose from a multitude of RCAs offering various amenities and fee-structures. The number and quality of amenities offered can change over time and is probably influenced by the age and location of the RCA, competition from other RCAs, and consumer demand. Without evidence to support a constant time-trend, the Langbein et al. (2004) results would be biased and inconsistent.

Second, the Langbein et al. (2004) empirical specification only includes RCA fees, whether the developer or professional manager manages the property, a measure of "community involvement", the number of services offered, the square-footage of the unit, the number of units in the property, and the 1999 assessed property value.

The authors fail to include a crucial variable: the age of the condominium at the time of sale. This omitted variable will bias the result downward and could represent some reverse causality. High RCA fees may lead to relatively lower property values, but lower property values, especially due to the property's age, will induce higher RCA fees. Older properties have higher RCA fees because future maintenance costs exceed the costs required to maintain newer properties. Some of this expected maintenance cost will be reflected in the individual unit's value but the costs of age will also be reflected in the

projected costs of maintaining the common areas, which will then be capitalized in property values relative to other condominiums.

Although the authors control for the base-year assessments, I do not think this adequately accounts for differently aged properties. An older property may not increase in value as quickly as a newer property or it may decrease in value more quickly. A linear relationship between age and property value is probably incorrect. As shown in Appendix A, including a variable for age reverses the Langbein et al. (2004) findings. Age can proxy for location, architectural-style and structural quality, crime rates, and expected maintenance.[124] RCA fees are based on projected maintenance fees, as well as the goods and services provided. If two properties are identical in every regard except age, the older property will have higher RCA fees, and hence lower property values, when those fees are capitalized into sales prices.

Furthermore, Langbein et al. (2004) assert that RCA's depress property values relative to the socially optimum level; however, a more pertinent benchmark would be the expected value of the property in the absence of an RCA. To reliably measure RCA efficiency, one needs a benchmark for the alternative state of the world. The researcher would like to know what property values are in the absence of the RCA, or before the RCA was instituted.

[124] Age can also proxy for the local government policies and services during a time period. This could make the formation of an RCA more or less likely in some years over others.

5 Empirical Specification

I would like to compare properties in RCAs to similar properties not in RCAs to estimate the value consumers place on RCA affiliation. In most of my analysis, I will not be able to identify the different sources of value (for example, aesthetic restrictions or amenities provided). I estimate the following regression:

$$\ln S_i = \beta_0 RCA_i + \beta_1 X_i + \varepsilon_i \quad (1)$$

Where $\ln(S_i)$ is the 2002-2005 sales price of property *i* in logarithmic form and *RCA* is a dummy variable that is equal to 0 when property *i* is not in an HOA and 1 when it is in an RCA. The **X**-vector includes variables for square footage, acreage, the number of bedrooms, the number of bathrooms, and whether or not there is a garage and the number of cars it can accommodate. I also include a variable for the age of the property at the date of sale, age-squared, and year and subdivision fixed-effects in some specifications.

Age is an important variable because it proxies for many different aspects of property value. The age of a property can reflect the depreciation in value due to nature's wear and tear, time, and technological innovations.[125] Age can proxy for the premium often placed on period-specific architecture, design and superior craftsmanship. Age can also proxy for the distance from the city center and the likeliness of being in a RCA.[126] RCAs are more likely to occur in the suburbs which tend to be outside of the city-center

[125] Asbestos and lead-paint are not used in newer homes. Larger-diameter water pipes and higher-voltage wiring are required by building-codes in more recent years.

[126] Cities typically develop from the inside and sprawl outwards. The oldest homes are typically in the center of the city.

and relatively younger. To the extent age proxies for location, it may also proxy for the ethnicity and diversity of the residential area.[127]

Year fixed-effects allow me to isolate the aspects of sale prices not associated with yearly housing-price growth and other macroeconomic factors. Subdivision fixed-effects allow for me to control for all of the differences between neighborhoods. In real estate, the largest difference between such similar neighborhoods is usually location.[128]

6 Data

My data comes from the Spartanburg County MLS dataset from 2002-2005. It includes sales prices and other housing characteristics for three Spartanburg County homeowners' associations and the non-HOA neighborhoods that are most similar. The non-HOA neighborhoods were chosen based on their similarity to the HOAs in terms of location, lot size, age, atmosphere and real estate comparables. The selections are subjective but take into account which neighborhoods potential buyers view as comparable.[129] All of the properties are in the same school district and the data includes information on the number of bedrooms, number of bathrooms, heated square-footage, acreage, garages, the closing date of the sale, and the age of the property at closing.

The data include information on five neighborhoods: Arbours, Williamsburg East, Oak Creek, Converse Heights and Andrews Farm. Converse Heights and Andrews Farms do not have residential community associations. The Arbours community is one of the

[127] This is particularly true if different ethnicities settled in certain areas within a small window of time.
[128] "Location, location, location," is the mantra of most realtors.
[129] As determined and advised by Spartanburg realtors and HOA board members. Driving through each neighborhood and HOA, one gets a feel for the level of comparability.

larger community associations in Spartanburg with over 65 homes. The RCA offers a community pool, tennis courts, walking trails, playground, trash pick-up, front-lawn maintenance, community lighting and common-area maintenance. Their RCA fees are between $60-70 per month.

Williamsburg East is another prominent Spartanburg RCA that includes about 35 houses and has by-laws governing lawns, house-siding and other aesthetics. The Oak Creek neighborhood has a "mandatory HOA" for lake-front properties. The mandatory association provides and maintains the lake for approximately 30 lakefront property-owners. "Mandatory HOA" fees of approximately $450 per year maintain the lake and keep it stocked with fish. Lakefront property owners are the only neighborhood residents with access to the lake and fishing. All of the neighborhoods with and without RCAs are in the same school district.

Table 3.1 summarizes sales prices for homes inside and outside of RCAs. Sales prices are higher for non-RCA properties in the raw data. The mean non-RCA sales price is $221,566 and the mean RCA sales price is $153,216. RCA properties have a lower range and tighter variance than their non-RCA counterparts.

Selected summary statistics for properties not in RCAs are included in Table 3.2a and statistics for RCA properties are shown in Table 3.2b. RCA and non-RCA properties appear to be very similar in terms of the number of bedrooms, bathrooms and acreage. Non-RCAs properties tend to be larger on average than RCA homes (2,525 heated square-feet instead of 1,875 square-feet in RCA properties). In this sample, non-RCA properties also tend to be much older on average than RCA properties. At the time of

closing, the mean non-RCA property is 58 years whereas the mean RCA property is 16.2 years.

7a Empirical Findings

The estimates from the dataset on selected Spartanburg County subdivisions are displayed in Table 3.3. Columns 1 and 2 show the estimates when age and age-squared are included and excluded. Column 3 includes variables for age and age-squared as well as year fixed-effects. Column 4 includes both year fixed-effects and subdivision fixed-effects. RCA affiliation appears to have a positive impact on sales prices in Column 4 and is estimated to increase sales prices by 2.2%. The average non-RCA sales price for the dataset is $221,566; therefore, RCA affiliation is estimated to increase the value of the property by $4,874 on average.

Although the estimates for age and age-squared are not individually significant, the overall specification is significant. The specification with age and age-squared outperforms the specification without the two variables in an F-test; it also outperforms the specification with each variable individually.[130]

The sign on age changes from positive to negative across specifications. This provides insight into how age may proxy for different property characteristics in different empirical specifications. In Column 4 subdivision is held constant. In this case, age is not allowed to proxy for neighborhood and location. Furthermore, age is more likely to proxy

[130] Including both age and age-squared outperforms the specification including only age, and the specification including only age-squared.

for physical deterioration instead of different architectural-schemes that could be neighborhood-specific.

Depending on how consumers value different types of space, the value of a home could decrease with additional bedrooms when square-footage is held constant because a larger fraction of living space is devoted to bedrooms.[131] Increasing the square-footage of a property by 1,000 square-feet increases the sales price by approximately 35%.

As shown in columns 1 through 4, acreage seems to act as a proxy for subdivision.[132] Acreage could continue to proxy for other excluded variables, particularly the distance from the city-center, after subdivision fixed-effects are included which could be the reason for the negative coefficient.

7b Arbours Community Association

Table 3.4 displays the results of the analysis for the Arbours community association. The Arbours neighborhood was built and established in 1993 and is most comparable to the Converse Heights neighborhood which is not affiliated with a RCA. Converse Heights is an older neighborhood with a mix of both old and new homes but the two have identical school systems, are close in proximity to one another and have similar community atmospheres. The Arbours RCA serves 65 single-family houses and the Converse Heights neighborhood includes about 1,200 houses.

The Arbours community association appears to increase property values by 1.7% relative to similarly situated properties in Converse Heights. Increasing the square-

[131] This means less square-footage can be allocated to kitchens, bathrooms and living areas. Recall that square-footage is "heated square-footage".
[132] I use the terms subdivision and neighborhood interchangeably.

footage of a property by 100 heated square-feet increases the sales price by approximately 10.5%. The sample size is relatively small and includes only 19 observations in the Arbours RCA which may explain the negative coefficients for bedrooms and acreage. Furthermore, lot-sizes in Converse Heights are typically much smaller than the Arbours neighborhood. Without subdivision fixed-effects, I believe acreage is serving as a proxy for neighborhood and location. As displayed in Table 3.4, if acreage were to double (increase by 100%) then the sales price is expected to decrease by 33%. The variables for age and age-squared are particularly important when comparing newer houses and neighborhoods to older houses and neighborhoods.

7c Case-Study: Oak Creek

The data on the Oak Creek subdivision provide a nice case-study on the pricing of a single good. Oak Creek is a neighborhood that has a "voluntary HOA" for all properties and a "mandatory HOA" for about 30 properties on the lake. The "voluntary HOA" maintains the entrance to the neighborhood and about 90% of the 120 properties voluntarily contribute the requested $100 per year. The mandatory HOA fees are paid by owners with lakefront properties. These property-owners are the only neighborhood residents with access to the lake and fishing.[133] Their fees of approximately $450 per year maintain the lake and keep it stocked with fish.[134]

Table 3.5 shows the results using Oak Creek sales prices for homes both in and out of the "mandatory HOA".[135] Only lakefront property owners are required to pay

[133] Access is patrolled around the lake and anyone without a proper permit can be cited for trespassing.
[134] Lake maintenance includes the plumbing and drainage for the lake and dredging the lake when necessary.
[135] I am essentially evaluating the net premium of lakefront living for this lake.

yearly dues to maintain the lake. The increase in property value due to the RCA is the capitalized net benefit that property-owners attribute to living on the lake. The value of lakefront property and lake-access is approximately 3.8% higher than non-lakefront property. For the sample, the mean non-lakefront sales price is $175,000 which equates to a capitalized increase in lakefront property values of $6650.[136]

The sample-size is small and includes only 19 observations, 5 of which are lakefront sales. Notice that within a neighborhood, acreage is positive but because of the small sample size, very few coefficients are statistically significant. Increasing the square-footage of an Oak Creek property by 1,000 square-feet increases the sales price by approximately 57%.

8 Conclusion

I estimate the average increase in property values from RCA affiliation to be 2.2% in three prominent Spartanburg RCAs. This RCA premium ranges from 1.7% for the largest RCA to 3.8% for the smallest RCA that applies only to lakefront property-owners in Oak Creek. These estimates are similar to the findings of Agan and Tabarrok (2005) that estimate RCA affiliation increases property values by 5.4% in Alexandria, Virginia.[137] Some of the existing literature suffers from a downward omitted variable bias because it excludes the age of the property at the time of sale. A variable for age is

[136] This equates to an average perceived total yearly benefit of $650 and a net yearly benefit of $200 ($650 less $450 fees) when the interest rate is fixed at 3% indefinitely.
[137] My estimates include year fixed-effects and the Agan and Tabarrok (2005) estimates include "age" but do not include year fixed-effects and they do not report the implications of including year fixed-effects.

important because it serves as a proxy for other less measurable determinants of property value.

I also discuss the theoretical and econometric challenges of empirically analyzing RCAs. When RCAs and local governments coexist, they compete with each other for fee-paying residents. Hence, the sheer existence of an RCA could induce a local government to become more efficient because it is no longer a monopoly provider of services.

Perhaps RCAs are simply the country clubs of the middle-class. RCAs provide the means for middle-income citizens to purchase a bundle of amenities not possible at the individual level. Such "luxury" goods in the club-like atmosphere provide gyms, pools, putting greens – goods that are desirable for middle-income Americans but financially difficult to purchase individually. Maintaining and purchasing a pool or putting green is very costly individually but not as much in aggregate.

Theoretically, one would expect efficiency to increase with smaller groups of collective decision-making. Future research could focus on the decision-making efficiency of relatively small governing bodies in comparison to a local government benchmark in the presence of dynamic competition between the two authorities. It may be interesting to compare the strictness of voting rules and by-laws across RCAs to see if more powerful RCA by-laws lead to higher property values than less stringent RCAs.

Future research may want to focus on RCAs as a form of "property value" insurance or warranty. From the extended warranty and "Dutch Book" literature, economists observe that some people are willing to pay for "peace of mind" and "one-stop shopping convenience" in the insurance and warranties markets. A property owner

cannot control who moves in beside him but an RCA can legally prohibit the new occupant from doing anything that radiates negative externalities. In this case, fees are paid each month to insure against losses in property value based on the maintenance of other homes in the area and common areas.

Table 3.1
Summary Sales Prices

Sales Price	Mean	Median	Minimum	Maximum	Observations
Non-RCA	$221,566	$192,450	$69,900	$553,000	94
(Std Deviation)	(105,057)				
RCA	$153,216	$132,250	$82,500	$410,000	32
(Std Deviation)	(62,861)				

Table 3.2a
Non-RCA Summary Statistics

Variable	Mean	Median	Minimum	Maximum
Sales Price	$221,566	$192,450	$69,900	$553,000
(Std. Deviation)	*(105,057)*			
Bedrooms	3.5	3.0	2.0	6.0
(Std. Deviation)	*(0.80)*			
Bathrooms	2.5	2.5	1.0	5.5
(Std. Deviation)	*(0.88)*			
Square-footage	2,525	2,487	763	5,748
(Std. Deviation)	*(937)*			
Acres	0.19	0.0	0.0	2.30
(Std. Deviation)	*(0.40)*			
Age	58	64	11	105
(Std. Deviation)	*(25)*			
Observations	94			

Table 3.2b
RCA Summary Statistics

Variable	Mean	Median	Minimum	Maximum
Sales Price	$153,216	$132,250	$82,500	$410,000
(Std. Deviation)	*(62,861)*			
Bedrooms	3.0	3.0	2.0	4.0
(Std. Deviation)	*(0.78)*			
Bathrooms	2.4	2.25	2.0	4.5
(Std. Deviation)	*(0.55)*			
Square-footage	1,875	1,685	1,050	4,125
(Std. Deviation)	*(642)*			
Acres	0.21	0.0	0.0	3.1
(Std. Deviation)	*(0.55)*			
Age	16.2	15.5	8.0	24
(Std. Deviation)	*(4.55)*			
Observations	32			

Table 3.3
The Value of RCAs: Select Spartanburg County Subdivisions

Table 3 displays the results of the analysis for all selected neighborhood properties in Spartanburg County. Columns 1 and 2 show the estimates when age and age-squared are included and excluded. Column 3 includes variables for age and age-squared as well as year fixed-effects. Column 4 includes both year fixed-effects and subdivision fixed-effects. RCA affiliation appears to have a positive impact on sales prices in Column 4. In Column 4, if acreage is doubled, sales prices decrease by 5.11%. Depending on how consumers value different types of space, the value of a home could decrease with additional bedrooms when square-footage is held constant because a larger fraction of living space is devoted to bedrooms. Increasing the square-footage of a property by 1000 square-feet increases the sales price by approximately 35%. A variable for garage is included in each specification.

Variable	*(1)* Age Omitted	*(2)* Age Included	*(3)* Age & Year Fixed-Effects	*(4)* Age, Year FE & Subdivision Fixed-Effects
RCA Affiliation	**-0.66**	**0.34**	**0.37**	**2.20*** **
(Std. Deviation)	*(0.44)*	*(0.64)*	*(0.64)*	*(0.81)*
Bedrooms	-3.33	-2.10	-4.96	-2.89
(Std. Deviation)	*(30.90)*	*(30.49)*	*(30.97)*	*(32.90)*
Bathrooms	7.45*	8.70**	8.59**	10.59***
(Std. Deviation)	*(3.89)*	*(3.88)*	*(3.92)*	*(3.80)*
Square-footage	0.39***	0.38***	0.38***	0.35***
(Std. Deviation)	*(0.04)*	*(0.04)*	*(0.04)*	*(0.04)*
Acres	-67.31	-62.86	-63.23	-5.11
(Std. Deviation)	*(42.10)*	*(41.61)*	*(43.00)*	*(49.47)*
Age	-	3.72	3.82	-1.31
(Std. Deviation)		*(3.66)*	*(3.73)*	*(5.00)*
Age-Squared	-	-0.02	-0.02	-0.02
(Std. Deviation)		*(0.03)*	*(0.03)*	*(0.04)*
Constant	11.05***	10.87***	10.86***	10.67***
(Std. Deviation)	*(0.08)*	*(0.12)*	*(0.13)*	*(0.14)*
Observations	126	126	126	126
Adjusted R^2	0.823	0.829	0.826	0.842

Note: All standard errors are clustered by subdivision. Significance at 0.01% is denoted by ***, 5% is denoted by ** and 10% is denoted by *.

Table 3.4
The Value of RCAs: Arbours Community Association

Table 4 displays the results of the analysis for the Arbours community association. The Arbours subdivision is most comparable to the Converse Heights neighborhood which is not affiliated with a RCA. The Arbours community association appears to increase property values relative to similarly situated properties in Converse Heights. Increasing the square-footage of a property by 100 square-feet increases the sales price by approximately 10.5%. The sample size is relatively small and includes only 19 observations in the Arbours RCA which may explain the negative coefficients for bedrooms and acreage. As shown below, variables for age and age-squared are particularly important when comparing newer houses and neighborhoods (Arbours), to older houses and neighborhoods (Converse Heights). A variable for garage is included in each specification.

Variable	*(1)* Age Omitted	*(2)* Age Included	*(3)* Age & Year Fixed-Effects
RCA Affiliation	**1.40*** **	**1.40*** **	**1.70*** **
(Std. Deviation)	*(0.10)*	*(0.26)*	*(0.52)*
Bedrooms	-3.21***	-3.44***	-3.24***
(Std. Deviation)	*(0.23)*	*(0.23)*	*(0.47)*
Bathrooms	1.88***	1.93***	1.93***
(Std. Deviation)	*(0.39)*	*(0.49)*	*(0.36)*
Square-footage	1.05***	1.06***	1.04***
(Std. Deviation)	*0.02*	*(0.03)*	*(0.02)*
Acres	-74.85***	-69.95***	-33.82***
(Std. Deviation)	*(11.65)*	*(5.44)*	*(17.99)*
Age	-	10.00***	11.14***
(Std. Deviation)		*(1.62)*	*(2.95)*
Age-Squared	-	-0.06***	-0.07***
(Std. Deviation)		*(0.01)*	*(0.02)*
Constant	4.29***	3.80***	3.90***
(Std. Deviation)	*(0.15)*	*(0.16)*	*(0.09)*
Observations	86	86	86
R^2	0.872	0.877	0.880

Note: All standard errors are robust standard errors. Significance at 0.01% is denoted by ***.

Table 3.5
Case Study: Oak Creek Properties

Table 5 displays the results of the analysis for Oak Creek Properties. The Oak Creek neighborhood has properties both in and out of the "lakefront" RCA. Only lakefront property owners are required to pay yearly dues of $450 to maintain the lake. The increase in property value due to the RCA is the capitalized net benefit that property-owners attribute to living on the lake. The value of lakefront property and access is approximately 3.8% higher than non-lakefront property. For the sample, 3.8% of $175,000 (for non-lakefront owners) is $6650. The sample-size is small and includes only 19 observations, 5 of which are lakefront sales. Notice that within a neighborhood, acreage is positive but because of the small sample size, very few coefficients are statistically significant. Increasing the square-footage of a property by 1000 square-feet increases the sales price by approximately 57%. A variable for garage is included in each specification.

Variable	*(1)* Age Omitted	*(2)* Age Included	*(3)* Age & Year Fixed-Effects
RCA Affiliation	**3.50****	**3.90****	**3.80****
(Std. Deviation)	*(1.30)*	*(1.75)*	*(1.49)*
Bedrooms	6.84	6.92	11.55*
(Std. Deviation)	*(4.94)*	*(5.64)*	*(5.27)*
Bathrooms	1.04	-1.18	-2.81
(Std. Deviation)	*(6.80)*	*(5.12)*	*(6.39)*
Square-footage	0.50***	0.49***	0.57***
(Std. Deviation)	*(0.11)*	*(0.09)*	*(0.11)*
Acres	20.87	19.63	20.11
(Std. Deviation)	*(12.84)*	*(12.46)*	*(13.13)*
Age	-	-15.54	75.50
(Std. Deviation)		*(88.79)*	*(85.06)*
Age-Squared	-	0.39	-2.77
(Std. Deviation)		*2.50*	*(2.50)*
Constant	10.41***	10.64***	9.76***
(Std. Deviation)	*(0.23)*	*(0.73)*	*(0.76)*
Observations	19	19	19
Adjusted R^2	0.940	0.9363	0.955

Note: All standard errors are robust standard errors. Significance at 0.01% is denoted by ***, 5% is denoted by ** and 10% is denoted by *.

Appendix A

Replication of Langbein et al. (2004) Analysis

Langbein et al. (2004) claim that condominium associations in the Washington D.C. area are inefficient and that property values decline as the number of RCA services increases. Theoretically, after buying in at a discount, members could increase property values with a simple vote that would be in every owner's best interest.

I Empirical Specification

Langbein et al. (2004) estimate the following regression:

$$V_i = \beta_0 ln(FEES_i) + \beta_1 X + \varepsilon_i \quad (1)$$

Where V_i is the 2000-2001 sales price of property *i* and *ln*(*FEES)* is the logarithm of RCA fees for property *i*. The **X**-vector includes variables for the 1999 assessed property value, RCA size, community involvement, vertical RCA governance, the number and type of RCA amenities, square footage, number of bedrooms, and number of bathrooms. After I replicate the Langbein et al. (2004) findings, I include a variable for each condominium's age.

The variable for 1999 assessed property values accounts for theoretically static factors effecting property values like the quality of the school district and the value of the location among others. RCA size is measured by the number of units under the RCA's jurisdiction. Community involvement is measured with a self-reported survey from the RCA's management regarding the level of resident involvement in community management ranked from "comatose = -3" to "hyperactive = +3". Community involvement can also be thought of as "horizontal governance". Vertical governance is

measured by the percentage of all RCA responsibilities run by outside professional hired by the board. This percentage is self-reported on the same survey used to measure community involvement. The number and type of RCA amenities are also from a self-reported survey where each RCA checks-off whether the particular amenity is offered[138]. The quality and frequency of amenities is not included in this measure.

II Data

Langbein et al. (2004) use a small panel of 195 condominium unit sales in six different RCAs to estimate the impact of RCAs on property values in Alexandria, Virginia. The data includes two years of residential condominium sales data: 1999 tax assessment values and 2000-2001 property sales values for six different HOA properties in Alexandria. The Langbein et al. (2004) data come from Metropolitan Regional Information Systems, Inc. (a multiple listing service used by realtors), the City of Alexandria, and a questionnaire. It also includes survey data on HOA quality and participation, some missing observations appear but the remaining observations are thought to be reliable. For the analysis, I augment the Langbein et al. (2004) data with one variable: condominium age.[139]

Langbein et al. (2004) interviewed a member of the RCA's Board of Directors to obtain detailed information about the nature of each RCA.[140] The RCAs are the only condominium communities in Alexandria, VA, a relatively small urban suburb of

[139] The various condominium websites were used to verify each condominium's age.

[140] Six RCAs were interviewed for the Langbein et al. (2004) study: 1) Watergate at Landmark Condominium Association, 2) Colecroft Station Condominium Association, 3) Potowmack Crossing Condominium Association, 4) Stonegate Condominium Association, 5) Parkfairfax Condominium Association, and 6) ParcEast Condominium Association.

Washington, DC with a population of 128,000. It occupies less than 16 square miles and is about 50 percent white, 20 percent black, and 15 percent Hispanic. Only properties sold in the two-year period (2000-2002) are used and actual sales price is the measure of property value.

The data provide variation over 1999 assessment values, RCA services provided, condominium age and sales prices. More detailed characteristics that are not included in the summary statistics chart include: square footage, number of bedrooms, bathrooms, and specific RCA amenities and services provided. The monthly RCA fees range from a minimum amount of $115 to a maximum at $602. The RCA fees are fairly standard within a condominium community, differing based on square footage, but vary across different condominium communities because of differences in amenities and services offered *and* condominium age.

A large variation in condominium age (3 to 59 years old) can have a large impact on HOA fees, as condominium age relates directly to maintenance and major repair work. Obviously, the largest impact on sales price in 2001 is the assessed value in 1999, ceteris paribus. The raw correlation between 2000-2001 sales price and 1999 assessed property value is 0.78. RCA monthly fees are positively correlated with the number of services offered and property value: 0.19 and 0.29, respectively. While the raw correlation between the *ln(property value)* and the *ln(condo age)* is 0.36.

Table A-1
Summary Statistics from Langbein et al. (2004)

Variable	Mean	Minimum Value	Maximum Value
Property Value 2000-2001	$138,321	$21,000	$310,000
(Std. Deviation)	*($45,846)*		
RCA Monthly Fees	$252	$115	$602
(Std. Deviation)	*($106)*		
% Professional Management	86.15	40	100
(Std. Deviation)	*(25.3)*		
Community Involvement	-0.07	-3	2
(Std. Deviation)	*(1.34)*		
Number of Services	9.38	5	10
(Std. Deviation)	*(1.12)*		
Number of Units in RCA	1059.8	110	1,684
(Std. Deviation)	*(705.9)*		
Assessed Property Value (1999)	$89,116	$40,200	$202,600
(Std. Deviation)	*($31,206)*		
Condo Age in Years at 2001	40.98	3	59
(Std. Deviation)	*(23.63)*		

III Results

I first revisit the Langbein et al. (2004) study and replicate their regression model. Due to multicollinearity and differences in standard error methods, I was never able to perfectly replicate the Langbein et al. (2004) findings; however, my replication results were very similar. After replicating the authors' method, I add a variable for condominium age to the regression.

With the additional variable for condominium age, I observe the results listed in Table A-2. The inclusion of "condo age" reverses the findings of Langbein et al. (2004) and estimates that increasing RCA fees leads to a statistically insignificant increase in sales price. Including "condo age" absorbs all of the variation Langbein et al. (2004) were reporting as RCA inefficiency. As shown in Table A-2, increasing the condominium's

age by one year, decreases property values by about $500 – something beyond the control of anyone, let alone the RCA. From this analysis, I cannot conclude that RCAs depress property values. No conclusions can be drawn with regard to comparative efficiency without a reliable benchmark.

Furthermore, even after including the "condo age" variable, the analysis still finds that property values decline with increases in services. This conflicts with economic intuition which would encourage RCA members to reduce services to the point where the marginal cost of each is equal to the marginal benefit.

Table A-2
Langbein et al. (2004) Estimates vs. Variable for Condo Age

	(1) Controls for Management	(2) Controls for Log(Management) and Services	(3) Controls for Management and Log(Services)	(4) Controls for Log(Management) and Services	(5) Dummy Variables	**(6) Variable for Condo Age**
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	**Coefficient**
Log RCA Fee	-0.26	-0.21	-0.18	-0.13	-	**0.0286**
(Std. Error)	(0.001)**	(0.005)**	(0.022)**	(0.101)**		**(0.0797)**
Log Services	-	-	-0.52	-0.40	-	-0.5070
(Std. Error)			(0.002)**	(0.007)**		(0.1365)**
Management (Vertical/Horizontal)	.0025	-	0.003	-	-	-0.0026
(Std. Error)	(0.001)**		(0.001)**			(0.0009)**
Log(Management (Vertical/Horizontal))	-	0.11	-	0.11	-	-
(Std. Error)		(0.001)**		(0.001)**		
Log Square Feet	0.67	0.65	0.59	0.55	0.51	0.4256
(Std. Error)	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.1578)**
Log Number Units	0.140	0.11	0.19	0.15	0.12	
(Std. Error)	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.0022)**	
Log 1999 Assessed Value	0.520	0.50	0.51	0.50	0.51	
(Std. Error)	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	
Condo Age	-	-	-	-	-	**-0.0080**
(Std. Error)						**(0.001)****
RCA1(Parkfairfax)	-	-	-	-	-0.20	-
(Std. Error)					(0.001)**	
RCA2(Stonegate)	-	-	-	-	0.12	-
(Std. Error)					(0.263)	
RCA3(ParcEast)	-	-	-	-	0.22	-
(Std. Error)					(0.079)	
RCA4 (Potowmack)	-	-	-	-	-0.21	-
(Std. Error)					(0.04)**	
RCA(Colecroft)	-	-	-	-	*Dropped*	-
(Std. Error)						
Constant	1.66	1.710	2.75	2.59	1.77	2.677
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.013)**	(0.610)**
Observations	195	195	195	195	195	195
R-squared	0.70	0.75	0.85	0.85	0.92	0.73

*Indicates significance at 5%; ** indicates significance at 1%.

REFERENCES

Agan, A.. and A. Tabarrok (2005): "What are Private Governments Worth? Do Homeowners' Associations raise property values?" *Regulation Magazine,* Fall.

Armington, C., and M. Odle (1982): "Small Business-How Many Jobs?" *Brookings Review,* **Fall**: 14-17.

Auten, G., and C. Robert (1999): "The Effect of Income-taxes on Household Income," The Review of Economics and Statistics, **81**(4): 681-693.

Beito, D., P. Gordon and A. Tabarrok (2002): "The Voluntary City," *University of Michigan Press,* Ann Arbor, MI.

Blundell, R., D. Alan, and M. Costas (1998): "Estimating Labor Supply Responses Using Tax Reforms," *Econometrica,* **66**(4): 827-861.

Birch, D. (1987): "Job Creation in America: How Our Smallest Companies Put the Most People to Work," Macmillan: New York.

Brown, C., J. Hamilton, and J. Medoff (1990): "Employers Large and Small," Harvard University Press: Cambridge.

Brueckner, J. (1982): ''A Test for Allocative Efficiency in the Local Public Sector,'' *Journal of Public Economics,* **19**: 311–31.

Campbell, J., S. Giglio, and P. Pathak (2009): "Forced Sales and House Prices," Working Paper No. 14866 (April), NBER, Cambridge, MA.

Carroll, R., D. Holtz-Eakin, M. Rider, and H. Rosen (2000a): "Income-tax and Entrepreneurs' Use of Labor," Journal of Labor Economics, **18**(2): 324-351. University of Chicago Press: Chicago.

———— (2000b): "Entrepreneurs, Income-taxes, and Investment," in *Does Atlas Shrug? The Economic Consequences of Taxing the Rich,* ed. by Joel Slemrod. Harvard University Press: Cambridge.

———— (2001): "Personal Income-taxes and the Growth of Small Firms," in *Tax Policy and the Economy,* ed. by J. Poterba. MIT Press: Cambridge.

Carroll, R., and D. Joulfaian (1995): "Taxes and Corporate Choice of Organization Form," Photocopied. U.S. Department of Treasury: Washington, DC.

Case, K. (2006): "Land and Property Price Appreciation in Selected U.S. Cities: A Historical Analysis," *Land Policies for Urban Development*, Lincoln Institute for Land Policy, Cambridge, MA.

Chetty, R. (2012): "Bounds on Elasticities with Optimization Frictions: A Synthesis of Micro and Macro Evidence on Labor Supply," NBER: Cambridge.

Cowling, M., P. Mitchell, and M. Taylor (1996): "Job Creators," Working paper. Warwick Business School, Centre for Small and Medium-Sized Enterprises: Coventry.

Davis, S., J. Haltiwanger, and S. Schuh (1993): "Small Business and Job Creation: Dissecting the Myth and Reassessing the Facts," Working Paper no. 4492. NBER: Cambridge.

Deere, D. (1991): "Unemployment Insurance and Employment," Journal of Labor Economics, October: 307-24.

Diamond, P. (1981): "Mobility Costs, Frictional Unemployment, and Efficiency," The Journal of Political Economy, **89**(4): 798-812.

Dilger, R. (1991): "Residential Community Associations: Issues, Impacts, and Relevance for Local Governments," State and Local Government Review, Carl Vinson Institute, University of Georgia, **1**: 17-23.

———— (1992): "Neighborhood Politics: Residential Community Associations in American Governance," New York/London: New York University Press.

Epstein, D., and S. O'Halloran (1999): "Delegating Powers: A Transaction Cost Politics Approach to Policy Making Under Separate Powers," Cambridge: Cambridge University Press.

Feenberg, D., and E. Coutts (1993): "An Introduction to the TAXSIM Model," Journal of Policy Analysis and Management, **12**(1): 189-194. http://www.nber.org/taxsim/

Feenberg, D., and J. Poterba (1993): "Income Inequality and the Incomes of 16 Very High-Income-taxpayers: Evidence from Tax Returns," In Tax Policy and the Economy, ed. by J. Poterba. MIT Press (for NBER): Cambridge.

Feldstein, M. (1976): "Personal Taxation and Portfolio Composition: An Econometric Analysis," Econometrica, **44**: 631-50.

———— (1995): "The Effect of Marginal Tax Rates on Taxable Income: A Panel Study of the 1986 Tax Reform Act," *The Journal of Political Economy*, **103**(3).

———— (1999): "Tax Avoidance and The Deadweight Loss Of The Income Tax," *The Review of Economics and Statistics*, **81**(4): 674-680. MIT Press: Cambridge.

Feldstein, M., and D. Feenberg (1993): "Higher Tax Rates with Little Revenue Gain: An Empirical Analysis of the Clinton Tax Plan," Tax Notes, **58**: 1653-57.

Foldvary, F. (1994): "Public Goods and Private Communities," Brookfield, VT: Edward Elgar.

Fullerton, D. (1994): "Inputs to Tax Policymaking: The Supply Side, the Deficit and the Level Playing Field," In American Economic Policy in the 1980s, ed. by M. Feldstein. University of Chicago Press (for NBER): Chicago.

Genesove, D. and C. Mayer (2001): "Loss Aversion and Seller Behavior: Evidence from the Housing Market," Working Paper no. 8143, NBER, Cambridge, MA.

Giertz, S., E. Saez, and J. Slemrod (2009): "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review," Working Paper no. 15012. NBER: Cambridge.

Ham, J., and S. Rea, Jr. (1987): "Unemployment Insurance and Male Unemployment Duration in Canada," Journal of Labor Economics, July: 325-53.

Hamermesh, D. (1993): "Labor Demand," Princeton University Press: Princeton.

Harberger, A. (1964): "Taxation, Resource Allocation, and Welfare," The Role of Direct and Indirect Taxes in the Federal Reserve System, 25-80. Princeton University Press: Princeton.

———— (1964a): "Principles of Efficiency: The Measurement of Waste," *The American Economic Association,* **54**(3): 58-76.

———— (1971): "Three Basic Postulates for Applied Welfare Economics," *The Journal of Economic Literature,* **9**(3): 785-797.

Helsley, R., and W. Strange (June 1998): "Private Government," Journal of Public Economics, **69**(2): 281-304.

Hipple, S. (2004): "Self-employment in the United States: An Update," Monthly Labor Review, **127**(7): 137-182.

Holmes, T., and J. Schmitz (1991): "Measuring Small Business Dynamics When Owners and Their Businesses Can Be Separately Identified," Dartmouth College: Hanover.

Holtz-Eakin, D., D. Joulfaian, and H. Rosen (1994): "Entrepreneurial Decisions and Liquidity Constraints," Rand Journal of Economics, **23**: 334-347.

Hyatt, W., and P. Downer (1987): "Condominium and Homeowner Association Litigation: Community Association Law," New York: John Wiley & Sons.

Jefferson, P. (1997): "Unemployment and Financial Constraints Faced by Small Firms," Economic Inquiry, **35**: 108-119.

Kiefer, N., and G. Neumann (1979): "An Empirical Job-Search Model, with a Test of the Constant Reservation-Wage Hypothesis," The Journal of Political Economy, **87**(1): 89-107.

Klein, D. (1988): "The power of homeowner associations," Los Angeles Times **28**(October): 1-36.

Kochin, L., and R. Parks (1988): "Was the Tax-Exempt Bond Market Inefficient or Were Future Expected Tax Rates Negative?" Journal of Finance, **43**(4): 913-931.

Kotliko, L., and L. Summers (1987): "Tax Incidence," In Handbook of Public Economics, ed. by A. Auerbach A, and M. Feldstein. **2**: 1043-1092. North-Holland: New York.

Langbein, L., and K. Spotswood-Bright (2004): "Efficiency, Accountability, and Private Government: The Impact of Residential Community Associations on Residential Property Values," Social Science Quarterly, **85**(3).

LaLumia, S. (2008): "Responses of the Self-Employed to the 2001 Tax Act," Proceedings of the 101st Annual Conference of the National Tax Association, 141-148.

Meyer, B. (1990): "Why Are There So Few Black Entrepreneurs?" Working Paper no. 3537. NBER: Cambridge.

Mieszkowski, P., and G. Zodrow (1989): "Taxation and the Tiebout Model." Journal of Economic Literature, **27**(September): 1098-1146.

Neumark, D., B. Wall, and J. Zhang (2008): "Do Small Businesses Create More Jobs? New Evidence for the United States from the National Establishment Time Series," Discussion Paper no. 3888. University of California at Irvine: Irvine.

Nickell, S. (1979): "Estimating the Probability of Leaving Unemployment," Econometrica, **47**(5): 1249-1266.

Norcross, C. (1973): "Townhouses and condominiums," Washington, DC: The Urban Land Institute.

Oates, W. (1969): "The Effects of Property Taxes and Local Public Spending on Property Values," Journal of Political Economy (November/December): 957-71.

Ostrom, E. (1990): "Governing the Commons: The Evolution of Institutions for Collective Action," New York: Cambridge University Press.

Poterba, J. (1986): "Explaining the Yield Spread between Taxable and Tax-exempt Bonds: The Role of Expected Tax Policy," Studies in State and Local Public Finance, 5-52. NBER: Cambridge.

Rabin, M., and R. Thaler (2001): "Anomolies: Risk Aversion." Journal of Economic Perspectives, **15**(1): 219-232.

Rich, M. (2003): ''Homeowner Boards Blur Line of Who Rules Roost,'' New York Times (July 23).

Saez, E. (2009): "Do Tax Filers Bunch at Kink Points? Evidence, Elasticity Estimation, and Salience Effects," Working Paper. University of California at Berkeley: Berkeley.

Salant, S. (1977): "Search Theory and Duration Data: A Theory of Sorts," The Quarterly Journal of Economics, **91**(1): 39-57.

Shoven, J., and J. Whalley (1972): "A General Equilibrium Calculation of the Effects of Differential Taxation of Income from Capital in the U.S.," Journal of Public Economics, **1**: 281-321. North-Holland Publishing Company.

———— (1973): "General Equilibrium with Taxes: A Computational Procedure and an Existence Proof," *The Review of Economic Studies,* **40(**4): 475-489. Oxford University Press: Oxford.

Stiglitz, J. (2000): "Economics of the Public Sector," 3rd ed. New York: W.W. Norton.

Thurston, N., and A. Libby (1997): "Taxes and Physicians' Use of Ancillary Health Labor," Working Paper. Brigham Young University: Salt Lake City.

Tiebout, C. (1956): "A Pure Theory of Local Expenditures," Journal of Political Economy, (October): 416-24.

Triest, R. (1990): "The Effect of Income-taxation on Labor Supply in the United States," Journal of Human Resources, **25**: 491-516.

Tullock, G. (1970): "Private Wants, Public Means: An Economic Analysis of the Desirable Scope of Government," Basic Books, Inc.: New York.

van Praag, C., and H. van Ophem (1995): "Determinants of Willingness and Opportunity to Start as an Entrepreneur," Kyklos, **48**: 513-540.

Vesey, T. (1983): "Gaithersburg homeowners unite, sue builders," The Washington Post (July 17): Bi, B5.

Weiss, M., and J. Watts (1989): "Community builders and community associations: The role of real estate developers in private residential governance. In Residential community associations: Private governments in the intergovernmental system?" ACIR.

Welch, F. (1977): "What have we learned from Empirical Studies on Unemployment Insurance?" Industrial and Labor Relations Review, **30**(4): 451-461.